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# ANCIENT SHIPS

By CECIL TORR, M.A.

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## PREFACE.

FOR some while I have been at work upon a history of ancient shipping; and the following pages are meant to form a portion of that history. Assuming that ancient shipping means shipping in the Mediterranean between 1000 B.C. and 1000 A.D., and that a history of shipping should deal with everything connected with ships, I find that I have upon my hands a task of no small magnitude; and I do not quite know when this task will be accomplished. That being so, I am bringing out this portion of the work before the rest; this portion being tolerably complete already, and dealing with a question that may conveniently be discussed apart from any other, namely, the character of the ships themselves.

Ancient ships have already formed the subject of dozens of books and pamphlets; and I necessarily have made myself acquainted with the bulk of this literature, from Dr Assmann's latest article in the *Archäologisches Jahrbuch* back to the treatise *De Re Navali* published by L. de Baif in 1536. I do not wish to underrate my obligations to previous writers on the subject, for they have informed me of many things that I was not at all likely to discover for myself. But, taking them altogether, I have found their works more voluminous than valuable. As a rule, they have relied too much upon their predecessors. A great many of their works are nothing more than careless compilations from those of earlier date; and hardly any of them fail to repeat a few exploded

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blunders. And then a great deal of energy has been mis-directed. Author after author has written as though the question was simply how he would set to work, if he were called upon to build a trireme; and accordingly there has been a crop of so-called restorations, which are principally works of the imagination, and do not always agree with the evidence on the few points that happen to be known for certain. And while many of the writers on the subject have thus contented themselves with a very slender knowledge of the evidence available, nearly all of them have shewn more zeal in collecting evidence than in sifting it sufficiently to ascertain its value.

The best of the written evidence comes from inscriptions. In digging the foundations for a building at the Peiræus in 1834, the workmen came upon a Roman or Byzantine drain, and found that it was lined with slabs of marble covered with inscriptions. These were some of the inventories of the Athenian dockyards, and a few others have come to light since then, the earliest of them dating from 373 and the latest from 323 B.C. or thereabouts. Unhappily, these inscriptions are shattered and defaced in many places; but where the reading is clear, their testimony is conclusive\*.

Next in importance are the statements that occur in ancient literature: but, unfortunately, very few of these are more than passing allusions; and the only one that enters into details is open to suspicion. This is the account that Athenæos gives of some stupendous ships that were built about 400 years before his time. In my opinion, this account is not to be accepted as a description of those particular ships: but I imagine that its authors based their statements on what they knew of ships in general; so that, with due allowance for exaggerations and anachronisms, every detail is

\* All these inscriptions are printed in the *Corpus Inscriptionum Atticarum*, vol. ii, nos. 789—812. The original set were edited by August Böckh in 1840 from copies by Ludwig Ross.

admissible as evidence in dealing with the ships of ancient times<sup>b</sup>. Of course, the literary evidence has all to be subjected to the ordinary tests, each statement being estimated by the value that we put upon its author and his means of information about the matter in hand. And peculiar difficulties arise when a thing is mentioned only once in literature, the question being whether this is due to chance, or must be taken to imply that the thing was not in vogue for any length of time. But that conclusion is not inevitable, even when a thing is mentioned several times by authors of one period and never once by those of earlier or later date; for those authors may only be repeating a simile or illustration that had struck the fancy of their generation. And, conversely, authors might go on repeating phrases that were no longer applicable; just as Plutarch and Lucian talk about akatian sails, although these sails had probably gone out of use some centuries before: the explanation being that the akatians were mentioned in a famous saying of Epicuros<sup>c</sup>.

There are also the statements of the scholiasts and lexicographers: but their evidence may be rejected altogether. So far as their assertions relate to matters that admit of proof, they are oftener wrong than right; and there is no reason for supposing that they were any better informed on matters that do not admit of proof. Such people felt bound to find a meaning for every word or phrase that came within their range; and if they did not happen to know, they simply had to guess.

The evidence from written sources is supplemented by evidence from material sources. There are the ruins of the docks at Athens to give a notion of the dimensions and proportions of the war-ships: and there are some rams and

<sup>b</sup> Athenæos, v. 37—39, quoting Callixenos, and v. 40—44, quoting Moschion. See especially pp. 9, 10 and 27 to 29 as to the reasons for suspecting these descriptions; and also note 118 on p. 50 for an example of the mode of dealing with such evidence.

<sup>c</sup> See p. 86 as to this.

figure-heads and anchors, but practically no other remnants of the ships themselves. A few models have been found: but these are all too rough to be instructive; and the chances are against our finding the splendid model that Lysander placed at Delphi—a trireme, three feet long, and made of ivory and gold<sup>4</sup>. There are plenty of pictures of the ships on painted vases and in frescos and mosaics, and figures of them on reliefs and coins and gems and works of art of every class; for they were constantly in favour with the artists of antiquity. But these works of art must all be taken at a discount. In dealing with so large a subject as a ship, an ancient artist would seize upon some characteristics, and give prominence to these by suppressing other features; and then would modify the whole design to suit the space at his disposal. Moreover, the treatment would vary with the form of art, painters and sculptors seeing things from different points of view; and it would vary also with the period, as art went through its phases. So, works of art may easily be taken to imply a difference in the ships themselves, when the difference is only in the mode of representing them.

The greatest caution is necessary in getting this evidence at second hand from books. If a restorer has handled the original relief or painting, his mistakes are sure to be embodied in the copy; and generally some fresh mistakes are introduced by draughtsmen and engravers and the people who touch up photographs. The result is that very few of the published copies are trustworthy in every detail, while many of them might rank as caricatures: and yet those copies are handed on from book to book, and quoted as authorities. But obviously the authors of these books have never made a search for the originals, for then they would have discovered that not a few of these supposed copies have no originals at all<sup>5</sup>.

<sup>4</sup> Plutarch, Lysander, 18. 2, *τριήρης, διὰ χρυσοῦ πεποιημένη καὶ ἐλέφαντος, δυεῖν πηχῶν*.

The evidence from all sources falls short of what is needed for a complete description of the ships; for although our information on certain points is ample and conclusive, there are many points on which we have no information whatever. Practically, this is not a matter of importance, as nobody is likely to resuscitate the ancient style of ship-building in its entirety; and hitherto no attention has been given to devices that might still be serviceable. Thus, for example, the ancients saw their way to supplement a square-sail by a triangular topsail with its base along the yard and its apex at the top of the mast, so that no additional yard was needed; and to reinforce the ram by a series of auxiliary rams above, which not only increased the damage to an

\* For example, in the last edition of Smith's *Dictionary of Greek and Roman Antiquities*, vol. ii, p. 218, there is a picture of an ancient anchor with flukes to its arms and no stock. A note says that the picture is taken from Baumeister. It occurs on p. 1614 in vol. iii of Baumeister's *Denkmäler des klassischen Altertums*; and there the statement is that the picture is taken from Kekulé, and that the original may be seen upon the balustrade round the temple of Athena Nike at Athens. But in Kekulé's *Reliefs an der Balustrade der Athena Nike* the picture is given on p. 12 among the *Ergänzungsskizzen*, merely as a suggestion of what might have filled a vacant place; and on the balustrade itself there is not the slightest trace of any anchor at all.—Again, in Smith's Dictionary, vol. i, p. 361, a picture of a boat, or coracle, is introduced with these remarks:—"The illustration, given both by Rich and Saglio, is taken from Scheffer, *De Militia Navali Veterum*, who describes it as from an ancient MS. of Vitruvius (Polenus, *Supplementum ad Grævium et Gronovium*, v. p. 831)." Saglio gives the picture on p. 915 of vol. i of Daremberg and Saglio's *Dictionnaire des Antiquités Grecques et Romaines*, saying that he took it from Scheffer, who took it from a MS. of Vitruvius, and that Rich had given it before. Rich gives it on p. 117 of his *Dictionary of Roman and Greek Antiquities*, third edition, saying that he took it from Scheffer, who took it from a MS. of Vitruvius. But Scheffer himself, p. 81—and Polenus reprints him rightly—says that he took it from a MS. of Vegetius. As a matter of fact, he did not take it from Vitruvius or Vegetius or from any MS. at all. An edition of Vegetius, *De Re Militari*, was printed at Paris in August, 1532. An edition of Robertus Valturius, *De Re Militari*, had been printed at the same press in July. And as the volumes were uniform, they generally were bound up together. Scheffer took the picture from an engraving on p. 316 of the treatise by Valturius. The engravings in this edition of Valturius are copied from the engravings in the original edition printed at Verona in 1472, and refer to matters of that period.—This sort of thing is not at all uncommon.

enemy, but also protected the stem from being crushed against her sides. Such devices as these, which proved of service in antiquity, would certainly be worth a trial on modern ships.

I must warn the reader that in the passages quoted in the notes I have silently omitted any subordinate clauses that do not bear upon the matter in hand. And also that I have made a rough use of round numbers in dating Egyptian monuments; my opinion being that the evidence does not justify the popular system of chronology.

The illustrations in plates 1 to 7 are by Mr J. A. Burt and those in 8 by Mr H. W. Bennett. I have never seen the originals of fgs. 10, 11, 29 to 31, and 40; but I can guarantee the accuracy of all the rest in every point on which I cite them as authorities. Unfortunately, the illustrations were arranged some while ago, before the book had assumed its present form; and they fall short of what would be desirable. But I hope that the complete work will contain a satisfactory copy of every monument that can elucidate the subject.

C. T.

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## ANCIENT SHIPS.

THE Mediterranean is a sea where a vessel with sails may lie becalmed for days together, while a vessel with oars could easily be traversing the smooth waters, with coasts and islands everywhere at hand to give her shelter in case of storm. In that sea, therefore, oars became the characteristic instruments of navigation ; and the arrangement of oars, the chief problem in shipbuilding. And so long as the Mediterranean nations dominated Western Europe, vessels of the southern type were built upon the northern coasts, though there generally was wind enough here for sails and too much wave for oars. But afterwards the nations of Western Europe filled the Mediterranean with sailing-vessels of the types they had devised for voyages on the Ocean ; and oars finally gave place to sails. Yet, only a few years before sails began in their turn to give place to steam, oars were still employed on vessels of considerable size that were intended for the Mediterranean alone ; and probably would have been more generally employed there, had there still been an adequate supply of galley-slaves. In the ancient world, however, the rower was not usually a slave : and it is a strange fact that Athenian citizens in the age of Pericles, who were in no wise unconscious of their own transcendent gifts, willingly laboured at the oar to generate a mechanical force that was directed by the intelligence of others.

The art of rowing can first be discerned upon the Nile. Boats with oars, as in fig. 2, are represented in the earliest pictorial monuments of Egypt, dating from about 2500 B.C.: and although some crews are paddling with their faces towards the bow, others are rowing with their faces towards the stern. The paddling is certainly the older practice; for the hieroglyph *chen* depicts two arms grasping an oar in the attitude of paddling, and the hieroglyphs were invented in the earliest ages. And that practice may really have ceased before 2500 B.C., despite the testimony of monuments of that date; for in monuments dating from about 1250 B.C. crews are represented unmistakably rowing with their faces towards the stern and yet grasping their oars in the attitude of paddling, as in figs. 3 and 5, so that even then Egyptian artists mechanically followed the turn of the hieroglyph to which their hands were accustomed. In these reliefs there are twenty rowers on the boats on the Nile, as in fig. 3, and thirty on the ships on the Red Sea, as in fig. 5; but in the earliest reliefs, as in fig. 2, the number varies considerably and seems dependent on the amount of space at the sculptor's disposal. In the contemporary relief representing a battle fought in the Mediterranean about 1000 B.C. the Egyptian war-ships, as in fig. 6, have from twelve to twenty-two rowers apiece according to the requirements of the sculptor, while the Asiatic war-ships, as in figs. 7 and 8, have not any rowers at all.

Among the Greeks the oars of a ship were collectively termed *tarsos*, and among the Hebrews ships of a certain type were known as ships of *taršiš*; and Tarsos and Taršiš

<sup>1</sup> Iliad, i. 308, 309, Ἀτρεΐδης δ' ἄρα νῆα θοὴν ὠλαδε προέρυσσεν, | ἐς δ' ἐρέτας ἔκρινεν ἐέλκοσιν. xvi. 168—170, πεντήκοντ' ἦσαν νῆες θοαί, ἦσιν Ἀχιλλεύς | ἐς Τροίην ἡγήετο Διὶ φίλος· ἐν δ' ἄρ' ἐκάστη | πεντήκοντ' ἔσαν ἄνδρες ἐπὶ κληΐδων ἐταῖροι. But this last line is clearly an interpolation: the κληΐδες are not mentioned elsewhere in the Iliad though often mentioned in the Odyssey—see note 110 on p. 46—and the number of rowers is unparalleled in the Iliad outside the Catalogue, while the number of the ships according to the Catalogue, ii. 685, would incite an interpolator to repetition.

<sup>2</sup> Iliad, i. 402—404, ὧχ' ἐκατόγχειρον καλέσας' ἐς μακρὸν Ὀλύμπου, | δὲν Βριάρεων καλέουσι θεοί, ἄνδρες δέ τε πάντες | Αἰγαίωνα.

<sup>3</sup> The story of the Minyæ, for example, as narrated by Herodotos, iv. 148.

were the Greek and Hebrew names for Tarsus in Cilicia. The coincidence suggests that this city was pre-eminent in furthering the use of oars upon the Mediterranean. But of this there are no records. The early progress of the Phœnicians and their neighbours must be divined from the progress of their disciples, the Greeks. In the *Iliad*, apart from the Catalogue, the Greeks have ships with twenty rowers<sup>1</sup>: but the allusion to Briareos, the hundred-handed giant of the Ægean, indicates some knowledge of the fifty-oared ship which forms so essential a feature in legends of somewhat later date, such as those of the fifty daughters of Danaos or the fifty comrades of Jason<sup>2</sup>. The thirty-oared ship belongs to legends of far later date<sup>3</sup>. In the *Odyssey* the Greeks still have ships with twenty rowers, while the Phæacians at Corfu have a ship with fifty<sup>4</sup>. An advance from twenty to fifty oars, without intermediate steps, seems hardly possible unless a nation was adopting the discoveries of another: and a greater advance, again at a single step, may be traced in the Catalogue of the Ships, which mentions ships with fifty rowers and ships with a hundred and eighteen<sup>5</sup>. Ships could not be indefinitely lengthened to accommodate an increasing number of rowers; and consequently the oars began to be arranged in two and then in three banks one above another. These ships with a hundred and eighteen rowers must have been two-banked ships formed by inserting ports for eight and fifty oars in the intervals between the tholes on ships of sixty oars. Yet the Greeks never employed sixty-oared ships, and apparently never knew that such existed, for they had no name for them: so the invention was not theirs.

<sup>1</sup> *Odyssey*, i. 280, νῆ' ἄρσας ἐρέτησιν ἐέλκοσιν. iv. 669, ἀλλ' ἄγε μοι δότε νῆα θοὴν καὶ ἐλκοσ' ἐταίρους. ix. 322, ὅσων θ' ἰσθὺν νηὶς ἐεικοσόροιο μελαίνης. viii. 34—36, ἀλλ' ἄγε νῆα μέλαιναν ἐρύσσομεν εἰς ἅλα διὰν | πρῶτόπλοον, κοῦρω δὲ δύνω καὶ πεντήκοντα | κρινάσθων κατὰ δῆμον. These fifty-two men would include *κελευστής* and *κυβερνήτης*, leaving fifty to row with one to mark time and one to steer; for they are described as *κοῦροι*, not *ἐρέται* or *ἐταῖροι*, as otherwise was customary.

<sup>2</sup> *Iliad*, ii. 719, 720, ἐπὶ νῆων ἐρέται δ' ἐν ἐκάστῃ πεντήκοντα | ἐμβέβασαν. 509, 510, τῶν μὲν πεντήκοντα νέες κλῖον· ἐν δὲ ἐκάστῃ | κοῦροι Βοιωτῶν ἑκατὸν καὶ ἐλκοσι βᾶνον. These hundred and twenty men, *κοῦροι*, would likewise include *κελευστής* and *κυβερνήτης*.

There is nothing to shew when or where the ancients first built war-ships with a single bank of oars<sup>6</sup>. But two-banked war-ships were certainly in use in Phœnicia about 700 B.C., for Phœnician war-ships are represented with two banks of oars in Assyrian sculpture of that date, as in figs. 10 and 11: and if three-banked war-ships were built in Egypt about 600 B.C., as Herodotos relates, they probably were in use in Phœnicia at a somewhat earlier date<sup>7</sup>. According to Thucydides, the first ships that were built by the Greeks for use in warfare, were built about 700 B.C. at Corinth and at Samos; and the first three-banked war-ships that were built for Greek fleets, were also built at Corinth; but vessels of that type were not built in large numbers by the Greeks until a little before 500 B.C., and then chiefly in Sicily and Corfu<sup>8</sup>.

<sup>6</sup> Various traditions about them are quoted, or misquoted, by Pliny, vii. 57, *longa nave Iasonem primum navigasse Philostephanus auctor est, Hegesias Paralum, Ctesias Semiramim, Archemachus Ægeonem; biremem Damastes Erythraos fecisse, triremem Thucydides Aminoclem Corinthium, quadriremem Aristoteles Carthaginienses, quinqueremem Mnesigiton Salaminios, sex ordinum Xenagoras Syracusios, ab ea ad decemremem Mnesigiton Alexandrum Magnum, ad XII ordines Philostephanus Ptolemæum Soterem, ad XV Demetrium Antigoni, ad XXX Ptolemæum Philadelphum, ad XL Ptolemæum Philopatorem.*

<sup>7</sup> Herodotos, ii. 159, παυσάμενος δὲ τῆς διώρυχος ὁ Νεκὼς ἐτρέπετο πρὸς στρατίας, καὶ τριῆρεις αἱ μὲν ἐπὶ τῇ βορρῇ θαλάσῃ ἐποιήθησαν, αἱ δ' ἐν τῷ 'Αραβίῳ κόλῳ· καὶ ταύτησί τε ἐχράτο ἐν τῷ δέοντι, κ.τ.λ. Nekau reigned from 610 to 594 B.C., or thereabouts. Clemens Alexandrinus, Stromateis, i. 16. 76, τοὺς τε Σιδωνίους (πρώτους ἀκηκάμεν) τρίκροτον ναὺν κατασκεύεσθαι.

<sup>8</sup> Thucydides, i. 13, ναυτικά τε ἐξηρτύετο ἡ 'Ελλάς καὶ τῆς θαλάσσης μᾶλλον ἀντείχοντο. πρῶτοι δὲ Κορίνθιοι λέγονται ἐγγύτατα τοῦ νῦν τρόπου μεταχειρίσασθαι τὰ περὶ τὰς ναῦς, καὶ τριῆρεις πρῶτον ἐν Κορίνθῳ τῆς 'Ελλάδος ναυπηγηθῆναι. φαίνεται δὲ καὶ Σαμίους 'Αμεινοκλῆς Κορίνθιος ναυπηγὸς ναῦς ποιήσας τέσσαρας· ἔτη δ' ἐστὶ μάλιστα τριακῶσια ἐς τὴν τελευταίην τοῦδε τοῦ πολέμου ὅτε 'Αμεινοκλῆς Σαμίους ἦλθεν. 14, ὀλίγον τε πρὸ τῶν Μηδικῶν καὶ τοῦ Δαρείου θανάτου τριῆρεις περὶ τε Σικελίαν τοῖς τυράννοις ἐς πλῆθος ἐγένοντο καὶ Κερκυραίοις· ταῦτα γὰρ τελευταῖα πρὸ τῆς Ξέρου στρατείας ναυτικά ἀξιόλογα ἐν τῇ 'Ελλάδι κατέστη. Αἰγινήται γὰρ καὶ 'Αθηναῖοι καὶ εἰ τινες ἄλλοι βραχέα ἐκέκτηντο, καὶ τούτων τὰ πολλὰ πεντηκοντόρους. cf. Diodoros, xiv. 42, ἀκούων γὰρ ὁ Διονύσιος ἐν Κορίνθῳ ναυπηγηθῆναι τριῆρη πρῶτον, κ.τ.λ. But while Diodoros says πρῶτον ἐν Κορίνθῳ, Thucydides takes care to say πρῶτον ἐν Κορίνθῳ τῆς 'Ελλάδος to save the priority of the Phœnicians. Thucydides can hardly mean that the Corinthians were building three-banked ships three centuries before the peace of 404 B.C. The allusion to their three-banked ships is parenthetical. His meaning must be that they were only then beginning to build war-ships of any sort. But, as to their priority in this, see Herodotos, i. 163, οἱ δὲ Φωκαῖες οὗτοι ναυτίλῃσι μακρῇσι

For more than two hundred years the three-banked ships were the largest war-ships afloat: but at length the system of successive banks was tested thoroughly. The extant fragments of the inventories of the Athenian dockyards merely shew<sup>9</sup> that ships of four banks were first built there shortly before 330 B.C. and ships of five banks in 325 B.C. But according to Diodoros<sup>10</sup> ships of four and five banks were built for the Syracusan fleet in 398 B.C., five-banked ships being then built for the first time; and according to Ælian<sup>11</sup> there were ships of five and six banks in that fleet forty years later. Pliny states that ships of four and five and six banks were first built at Chalcedon and Salamis and Syracuse respectively; and then Alexander the Great made the advance to ten banks<sup>12</sup>. A whole fleet of seven-banked ships was built by

πρώτοι Ἑλλήνων ἐχρήσαντο, καὶ τὸν τε Ἀδρίην καὶ τὴν Τυρσηνὴν καὶ τὴν Ἰβηρίην καὶ τὸν Ταρτησὸν οὗτοι εἰσι οἱ καταδέξαντες· ἐναντίῳ δὲ οὐ στρογγύλῃσι νηυσὶ ἀλλὰ πεντηκοντέροισι. Herodotos, however, may only mean that the Phocæans were the first Greeks to employ these war-ships on trading voyages and thus defy the piracy in the Western Mediterranean.

<sup>9</sup> Corp. Inscr. Attic. vol. ii, no. 807, col. b, ll. 76—79, τετρήρεις δ' ἐμ μὲν τοῖς νευροῖς παρέδομεν Π|||, ἐμ πλῶ δὲ Δ—'Ἀριστοφώντος ἀρχοντος, 330/329 B.C.: no. 809, col. d, ll. 87—91, τετρήρεις δ' ἐμ μὲν τοῖς νευροῖς παρέδομεν ΔΔΔΔ||| καὶ πεντήρεις Π||, τετρήρεις δ' ἐμ πλῶ Π||—'Ἀντικλέους ἀρχοντος, 325/324 B.C. Ships of four and five banks are not previously mentioned in these lists. There is a list for the year before 325/324, no. 808, col. d, ll. 22—39; but none at present for the years immediately before 330/329. The first eighteen four-banked ships probably were built in two or three years, as the next thirty-two were built in five years besides seven five-banked ships; so the Athenians probably built their first four-banked ship in 331 or 332 B.C.

<sup>10</sup> Diodoros, xiv. 42, ἤρξατο δὲ (Διονύσιος) ναυπηγεῖσθαι τετρήρεις καὶ πεντηρικὰ σκάφη, πρῶτος ταύτην τὴν κατασκευὴν τῶν νεῶν ἐπινοήσας. cf. 41, διανοεῖτο γὰρ κατασκευάσαι ναῦς τετρήρεις καὶ πεντήρεις, οὐδέπω κατ' ἐκείνους τοὺς χρόνους σκάφους πεντηρικοῦ νευαυπηγημένου. 44, ἀπέστειλεν πεντήρη, πρῶτον νευαυπηγημένην.

<sup>11</sup> Ælian, variae historiae, vi. 12, ναῦς μὲν ἐκέκρητο (Διονύσιος ὁ δευτερός) οὐκ ἐλάττους τῶν τετρακοσίων, ἐξήρεις καὶ πεντήρεις· πεζῶν δὲ δύναμιν εἰς δέκα μυριάδας, ἱππεῖς δὲ ἑννεακισχιλίους. Diodoros, xvi. 9, mentions these forces in narrating the events of 357 B.C., so Ælian is probably referring to that date: but Diodoros says nothing about the size of the ships.

<sup>12</sup> Pliny, vii. 57, already quoted in note 6. cf. Clemens Alexandrinus, stromateis, i. 16. 75, Καρχηδόνιοι δὲ πρῶτοι τετρήρη κατεσκεύασαν, ἐναυπήγησε δὲ αὐτὴν Βόσπορος, where the allusion to Bosporos shews that Chalcedon is meant, not Carchedon or Carthage. The common spelling, Calchedon for Chalcedon, would induce the error.

Alexander on the Euphrates in 323 B.C., according to Quintus Curtius: but the other biographers of Alexander nowhere mention ships of more than five banks<sup>13</sup>. According to Diodoros, there were ships of six and seven banks in the fleet of Demetrios Poliorketes at the battle off Cyprus in 306 B.C., but none of more than five banks in the fleet of his opponent, Ptolemy Soter; while there had been a few ships of nine and ten banks in a fleet formed in 314 B.C. by Antigonos, the father of Demetrios, though apparently no other ships in that fleet were of more than five banks<sup>14</sup>. Pliny states that ships of twelve and fifteen banks were built by Ptolemy and Demetrios respectively: and a fifteen-banked ship is ascribed to Ptolemy by Pollux<sup>15</sup>. An eleven-banked

<sup>13</sup> Quintus Curtius, x. 1. 19, *igitur Mesopotamiae pratoribus imperavit (Alexander) materia in Libano monte caesa devectaque ad urbem Syria Thapsacum, septingentarum carinas navium ponere: septiremes omnes esse, deducique Babyloniam. Cypriorum regibus imperatum, ut æs stuprumque et vela præberent.* The statements of Aristobulos, who was present, are cited by Arrian, *anabasis*, vii. 19, *κατέλαβε δὲ (Ἀλέξανδρος) ἐν Βαβυλῶνι, ὡς λέγει Ἀριστόβουλος, καὶ τὸ ναυτικόν· τὸ μὲν κατὰ τὸν Εὐφράτην ποταμὸν ἀναπεπλευκὸς ἀπὸ θαλάσσης τῆς Περσικῆς· τὸ δὲ ἐκ Φοινίκης ἀνακεκομμένον, πεντήρεις μὲν δύο τῶν ἐκ Φοινίκων, τετρήρεις δὲ τρεῖς, τριήρεις δὲ δώδεκα, τριακοντόρους δὲ ἐς τριάκοντα· ταύτας ξυντμηθείσας κομισθῆναι ἐπὶ τὸν Εὐφράτην ποταμὸν ἐκ Φοινίκης ἐς Θάψακον πόλιν, ἐκεῖ δὲ ξυμπηχθείσας αὐθις καταπλεῦσαι ἐς Βαβυλῶνα.* λέγει δὲ ὅτι καὶ ἄλλος αὐτῷ ἐναυπηγεῖτο στόλος τέμνοντι τὰς κυπαρίσσους τὰς ἐν τῇ Βαβυλωνίᾳ. Also by Strabo, xvi. 1. 11, *τὰ πλοῖα τὰ μὲν ἐν Φοινικῇ τε καὶ Κύπρῳ ναυπηγησάμενον διάλυτά τε καὶ γομφωτά, ἃ κομισθέντα εἰς Θάψακον σταθμοῖς ἐπὶ εἰτα τῷ ποταμῷ κατακομισθῆναι μέχρι Βαβυλῶνος, τὰ δ' ἐν τῇ Βαβυλωνίᾳ συμπηξάμενον τῶν ἐν τοῖς ὁλοσεσι καὶ τοῖς παραδείσοις κυπαρίττων.* And probably also by Plutarch, Alexander, 68, *καὶ πλοῖα παντοδαπὰ περὶ Θάψακον ἐπήγγυτο.* These statements shew that Curtius has confounded the ships that were built on the Euphrates with those other ships that were brought over in sections from Phoenicia; and sufficiently disprove his assertion that this fleet consisted entirely of seven-banked ships. But possibly the word *septiremes* stands for some word like *solutiles* denoting that the ships were in sections.

<sup>14</sup> Diodoros, xx. 49, *εἶχε δὲ (Πτολεμαῖος) τὰς πάσας ναῦς μακρὰς ἑκατὸν καὶ τετταράκοντα· τούτων δ' ἦν ἡ μεγίστη πεντήρης, ἡ δ' ἐλαχίστη τετρήρης.* 50, *αὐτὸς δὲ (Δημήτριος) ἐκτάξας τὰς ναῦς ἀπῆντα τοῖς πολεμοῖσι, ἔχων τὰς ἀπάσας ὀκτὼ πλείους τῶν ἑκατὸν σὺν ταῖς πληρωθείσαις ἐκ τῶν χωρίων τῶν ληφθέντων· τούτων δ' ἦσαν αἱ μέγισται μὲν ἐπτήρεις, αἱ πλείους δὲ πεντήρεις.* καὶ τὸ μὲν εὐώνυμον κέρας ἐπέειχον ἐπτήρεις μὲν ἐπὶ τὰ Φοινίκων, τετρήρεις δὲ τριάκοντα τῶν Ἀθηναίων· ἐπίπλους δὲ τούτοις ἔταξεν ἐξήρεις δέκα καὶ πεντήρεις ἄλλας τοσαύτας, κ.τ.λ. Speaking of the two hundred and forty war-ships collected by Antigonos, he says, xix. 62, *τούτων δ' ἦσαν τετρήρεις μὲν ἐνενήκοντα, πεντήρεις δὲ δέκα, ἐννήρεις δὲ τρεῖς, δεκῆρεις δὲ δέκα, ἀφρακτοὶ δὲ τριάκοντα.* The rest presumably had the normal three banks.



ship unquestionably was built by Demetrios, for the fact is mentioned by Theophrastos, a contemporary whose position secured him most trustworthy information<sup>16</sup>. She was built in Cyprus; and therefore after the naval victory in 306 B.C., which made Demetrios master of the island and its timber. According to Plutarch<sup>17</sup>, Demetrios had a thirteen-banked ship in 301 B.C., and built ships of fifteen and sixteen banks in 288 B.C. And there certainly was a ship of sixteen banks in the Macedonian fleet a century afterwards. She was expressly mentioned in the treaty with the Romans in 197 B.C.: her arrival in the Tiber in 167 B.C. was a memorable event; and she afterwards gave her name to one of the docks at Rome<sup>18</sup>.

<sup>15</sup> Pliny, vii. 57, already quoted in note 6. Pollux, i. 83, καὶ Πτολεμαίου ναὺς, πεντεκαϊδεκῆρης· καὶ Ἀντιγόνου, τριάρμενος. For the meaning of τριάρμενος see note 124 on p. 54.

<sup>16</sup> Theophrastos, *historia plantarum*, v. 8. 1, ἐν Κύπρῳ γοῦν οὐκ ἔτεμον οἱ βασιλεῖς (τὰ δένδρα) ἅμα μὲν τηροῦντες καὶ ταμεινόμενοι ἅμα δὲ καὶ διὰ τὸ δυσκόμωστον εἶναι. μήκος μὲν ἦν τῶν εἰς τὴν ἐνδεκῆρην τὴν Δημητρίου τμηθέντων τρισκαϊδεάδρυνοι, αὐτὰ δὲ τὰ ξύλα τῷ μήκει θαυμαστά καὶ δοῖα καὶ λεία. This is repeated by Pliny, xvi. 76, with some exaggerations.

<sup>17</sup> Plutarch, *Demetrius*, 31, ὁ γοῦν Δημήτριος τότε προσέπεμψε τοῖς Ἀθηναίοις ἐγκαλὼν μετρίως, ἀξιῶν δὲ τὰς ναὺς ἀπολαβεῖν, ἐν αἷς ἦν καὶ ἡ τρισκαϊδεκῆρης. cf. 30, καὶ γὰρ καὶ ναὺς ἐκεῖ καὶ χρήματα καὶ γυναῖκα ἐτύγχανε καταλελοιπώς. 32, πρότερον μὲν Σέλευκος ἐστιάσας ἐπὶ σκηνῆς ἐν τῇ στρατοπέδῳ Δημήτριον, αὐθις δὲ Δημήτριος ἐκείνῳ ἐν τῇ τρισκαϊδεκῇ δεξάμενος. 43, στόλον δὲ νεῶν ἅμα πεντακοσίων καταβαλλόμενος τὰς μὲν ἐν Πειραιεὶ τρόπεις ἔθετο, τὰς δὲ ἐν Κορίνθῳ, τὰς δὲ ἐν Σαλκίδι, τὰς δὲ περὶ Πέλλαν, αὐτὸς ἐπιὼν ἐκασταχόσε καὶ διδάσκων ἃ χρὴ καὶ συντεχνώμενος, ἐκπληττομένων ἀπάντων οὐ τὰ πλῆθη μόνον ἀλλὰ καὶ τὰ μεγέθη τῶν ἔργων· οὐδεὶς γὰρ εἶδεν ἀνθρώπων οὔτε πεντεκαϊδεκῆρη ναὺν πρότερον οὔτε ἐκκαϊδεκῆρη. cf. 20, καὶ τὰς μὲν ἐκκαϊδεκῆρεις αὐτοῦ καὶ τὰς πεντεκαϊδεκῆρεις ἐθαύμαζον ἐστῶτες οἱ πολέμοι παρὰ τὴν γῆν αὐτῶν πλεούσας, κ.τ.λ.

<sup>18</sup> This treaty is cited by Polybios, xviii. 27, τὰ δ' αἰχμάλωτα καὶ τοὺς αὐτομόλους ἅπαντας ἀποκαταστήσαι Φίλιππον Ῥωμαίοις ἐν τοῖς αὐτοῖς χρόνοις· ὁμοίως δὲ καὶ τὰς καταφρόκτους ναὺς, πλὴν πέντε σκαφῶν καὶ τῆς ἐκκαϊδεκῆρους, and by Livy, xxxiii. 30, *captivos transfugasque reddere Philippi Romani, et naves omnes intactas tradere præter quinque et regiam unam inhabitabilis prope magnitudinis, quam sexdecim versus remorum agebant*. The arrival in the Tiber is described by Plutarch, *Æmilius Paulus*, 30, ἀνέπλει τὸν Θύβριν ποταμὸν ἐπὶ τῆς βασιλικῆς ἐκκαϊδεκῆρους κατεσκευασμένης εἰς κόσμον ὅπλοις αἰχμαλώτοις καὶ φοινικίσιν καὶ πορφύραις, ὥς καὶ πανηγυρίζειν ἔξωθεν καθάπερ εἰς τινα θριαμβικῆς θέαν πομπῆς καὶ προαπολαύειν τοὺς Ῥωμαίους τῷ βοθίῳ σκέδην ὑπάγοντι τὴν ναῦν ἀντιπαρετάγοντας, and also by Livy, xlv. 35, *Paulus ipse post dies paucos regia nave ingentis magnitudinis, quam sexdecim versus remorum agebant, ornata Mace-*

War-ships of still greater size are ascribed to Ptolemy Philadelphos and Ptolemy Philopator, who ruled Egypt from 285 to 247 B.C. and from 222 to 204 B.C. respectively. Athenæos states that, besides various ships of thirteen banks or less, Philadelphos had one ship of twenty banks and two of thirty banks, while Philopator built a ship of forty banks; and he quotes a long account of this ship from Callixenos of Rhodes<sup>19</sup>. Plutarch states that Philopator built a ship of forty banks, and then describes her in the phrases employed by Athenæos, so that he is also quoting from Callixenos<sup>20</sup>. Pliny states independently, on the authority of Philostephanos of Cyrene, that Philadelphos and Philopator built ships of thirty and forty banks respectively<sup>21</sup>. And these amazing statements have partly been confirmed by an inscription that was unearthed a few years ago in the temple of Aphrodite at Paphos in Cyprus, namely, a dedication by the reigning

*donicis spoliis non insignium tantum armorum sed etiam regionum textitium, adverso Tiberi ad urbem est subvectus, completis ripis obviam effusa multitudine*, both authors doubtless copying the lost description by Polybios, who was in Rome soon afterwards and knew Paulus intimately. cf. Eutropius, iv. 8, *Romam cum ingenti pompa rediit (Paulus) in nave Persei, quæ inusitata magnitudinis fuisse traditur, adeo ut sexdecim ordines dicatur habuisse remorum*. The dock is mentioned by Polybios, xxxvi. 3, δι' οὗ παρακομισθέντες ἀσφαλῶς εἰς τὴν Ῥώμην, ἀνεκλείσθησαν ὁμοῦ πάντες εἰς τὸ τῆς ἐκκαίδεκάρου νεώριον.

<sup>19</sup> Athenæos, v. 36, πολλῶν δ' ὁ Φιλάδελφος βασιλέων πλοῦτῳ διέφερε, καὶ περὶ πάντα ἐσπουδάκει τὰ κατασκευάσματα φιλοτίμως, ὥστε καὶ πλοίων πλήθει πάντας ὑπερέβαλλε. τὰ γοῦν μέγιστα τῶν πλοίων ἦν παρ' αὐτῷ τριακοντῆρεις δύο, εἰκοσῆρης μία, τέσσαρες τρισκαίδεκῆρεις, δωδεκῆρεις δύο, ἐνδεκῆρεις τεσσαρεσκαίδεκα, ἐννῆρεις τριάκοντα, κ.τ.λ. 37, ἐπεὶ δὲ περὶ νεῶν κατασκευῆς εἰρήκαμεν, φέρ' ἔπωμεν καὶ τὰ ὑπὸ τοῦ Φιλοπάτορος βασιλέως κατασκευασμένα σκάφη· περὶ ὧν ὁ αὐτὸς Καλλίξενος ἱστορεῖ ἐν τῷ πρώτῳ Περὶ Ἀλεξανδρείας οὕτως λέγων—τὴν τεσσαρκοντῆρη ναὺν κατασκεύασεν ὁ Φιλοπάτωρ, κ.τ.λ. The date of Callixenos cannot be fixed. A certain Callixenos held some high office at Rhodes about 100 B.C., for his name is found on Rhodian coins of that period: but there is nothing to shew that he was the historian.

<sup>20</sup> Plutarch, Demetrius, 43, ἀλλ' ὕστερον τεσσαρκοντῆρη Πτολεμαῖος ὁ Φιλοπάτωρ ἐναυπηγήσατο, μήκος διακοσίων ὀγδοήκοντα πηχῶν, ὕψος δὲ ἕως ἀκροστολίου πεντήκοντα δυεῖν δεόντων, ναῦταις δὲ χωρὶς ἐρετῶν ἐξηρτυμένην τετρακοσίοις, ἐρέταις δὲ τετρακισχίλοις, χωρὶς δὲ τούτων ὀπίστας δεχομένην ἐπὶ τε τῶν παρόδων καὶ τοῦ καταστρώματος ὀλίγῃ τρισχίλων ἀποδέοντας. cf. Athenæos, v. 37, τὸ μήκος ἔχουσιν διακοσίων ὀγδοήκοντα πηχῶν... ὕψος δὲ ἕως ἀκροστολίου τεσσαράκοντα ὀκτὺ πηχῶν... ἐδέξατο ἐρέτας πλείους τῶν τετρακισχίλων, εἰς δὲ τὰς ὑπηρεσίας τετρακοσίοις· εἰς δὲ τὸ κατὰστρωμα ἐπιβάτας τρισχίλους, ἀποδέοντας ἑκατὸν καὶ πεντήκοντα.

Ptolemy of the statue of a man who is there described as the architect of the thirty-banked ship<sup>21</sup>. There may have been a forty-banked ship: but Callixenos seems quite untrustworthy in his account of her. According to Diodoros<sup>22</sup>, Sesostris built a sacred barge upon the Nile two hundred and eighty cubits in length: and numerous representations shew, as in fig. 3, that these sacred barges were vessels of light draught with curiously elevated stems and sterns. Now, according to Callixenos, the length of the forty-banked ship was two hundred and eighty cubits, the draught was under four cubits, and the height of the terminal ornaments at the stem and the stern was forty-eight and fifty-three cubits respectively<sup>23</sup>. These measurements must belong to one of those sacred barges, probably to the one mentioned by Diodoros: and such a barge could not possibly have forty banks of oars.

<sup>21</sup> Pliny, vii. 57, already quoted in note 6. Athenæos says that Philostephanos was a friend or follower of Callimachos, viii. 3, Καλλιμάχου δὲ γνῶριμος, and Callimachos died about 240 B.C.

<sup>22</sup> This inscription is printed in the *Journal of Hellenic Studies*, vol. ix, p. 255:—Β]ασιλεὺς Πτολεμαῖος | Πυργ]οτέλην Ζώητος ἀρχιτεκτονήσ[αντα | τὴν τριακον-  
τήρη καὶ εἰκ[οστήρη. The term ἀρχιτέκτων was often applied to naval-architects: Aristotle, *res publica Atheniensium*, 46, χειροτονεῖ δ' ἀρχιτέκτονας ὁ δῆμος ἐπὶ τὰς ναῦς, cf. Athenæos, v. 40, Diodoros, iv. 41.

<sup>23</sup> Diodoros, i. 57, ἐναυπηγήσατο δὲ (Σεσόστρις) καὶ πλοῖον κέδριμον τὸ μὲν μήκος πηχῶν διακοσίων καὶ ὀγδοήκοντα, τὴν δ' ἐπιφάνειαν ἔχον τὴν μὲν ἐξωθεν ἐπίχρυσον, τὴν δ' ἐνδοθεν κατηγυρωμένην· καὶ τοῦτο μὲν ἀνέθηκε τῷ θεῷ τῷ μάλιστα ἐν Θήβαις τιμωμένῳ, κ.τ.λ. This statement is not incredible. According to the Harris papyrus—plate 7, line 5, in Birch's facsimile—Ramessu III provided the great god at Thebes with a vessel of cedar-wood, decorated with bronze and gold, and a hundred and thirty cubits in length.

<sup>24</sup> Athenæos, v. 37, τὴν τεσσαρακοντήρη ναὺν κατεσκεύασεν ὁ Φιλοπάτωρ, τὸ μήκος ἔχουσιν διακοσίων ὀγδοήκοντα πηχῶν, ὀκτώ δὲ καὶ τριάκοντα ἀπὸ παρόδου ἐπὶ πάροδον, ὕψος δὲ ἕως ἀκροστολίου τεσσαράκοντα ὀκτὼ πηχῶν, ἀπὸ δὲ τῶν πρυμνητικῶν ἀφλάστων ἐπὶ τὸ πρὸς τῇ θαλάσῃ μέρος αὐτῆς τρεῖς πρὸς τοῖς πενήκοντα πήχεις.....ὕστερον δὲ τῶν ἀπὸ Φοινίκης τις ἐπενήσκει τὴν καθολικὴν, τάφρον ὑποστήσάμενος ἰσην τῇ νηὶ κατὰ μήκος, ἣν πλησίον τοῦ λιμένος ὤρυξε. ταύτῃ δὲ τοὺς θεμελίους κατωκοδόμησε λίθῳ στερεῷ πρὸς πέντε πήχεις τὸ βάθος, καὶ διὰ τούτων φάλαγγας ἐπικαρσίας κατὰ πλάτος τῆς τάφρου διώσας συνεχεῖς, τετράπηχυν εἰς βάθος τόπον ἀπολιπούσας. καὶ ποιήσας εἰσρουν ἀπὸ τῆς θαλάσσης ἐνέπλησεν αὐτῆς πάντα τὸν ὀρυχθέντα τόπον, εἰς δὲ βραδίως ἀπὸ τῶν τυχόντων ἀνδρῶν εἰσήγαγε τὴν ναῦν. As the ship was floated into the dock, and the dock was only four cubits in depth, the ship must have drawn less than four cubits of water.

According to Callixenos, the longest oars on the alleged forty-banked ship were thirty-eight cubits in length, the extreme breadth of the ship also being thirty-eight cubits, or fifty-seven feet. And he adds that they were weighted with lead inboard to balance the excessive length outboard: but this statement may safely be referred to the sacred barge from which he has evolved his ship, as some such weights are represented on the steering-oars of the sacred barge in fig. 3, and none are elsewhere ascribed to any ancient war-ship<sup>25</sup>. The oars of a three-banked ship must all have been of very moderate size and weight; for a crew could make a forced march when each man was carrying his oar and its appurtenances<sup>26</sup>. In war-ships there were always as many rowers as oars: but in some smaller vessels the oars were light enough to be sculled in pairs<sup>27</sup>.

Of the two hundred oars<sup>28</sup> which an Athenian three-banked ship carried for her crew of two hundred men, a hundred and seventy belonged to the three banks, while the remaining thirty were *perineōi*—a term which also denoted the men who did not row in the banks<sup>29</sup>. These thirty men must have worked these thirty oars from above the upper decking, for

<sup>25</sup> Athenæos, v. 37, πηδάλια δ' εἶχε τέτταρα τριακονταπήχη, κώπας δὲ θρανιακάς ὀκτὼ καὶ τριάκοντα πηχῶν τὰς μεγίστας, αἱ, διὰ τὸ μόνυβδον ἔχειν ἐν τοῖς ἐγχειριδίοις καὶ γεγρονέναι λίαν εἰσὼ βαρεῖαι κατὰ τὴν ζύγῳσιν, εὐθέραις ὑπῆρχον ἐπὶ τῆς χρείας. The extreme breadth of the ship is determined by the words already quoted in note 24, ὀκτὼ δὲ καὶ τριάκοντα (πηχῶν) ἀπὸ παρόδου ἐπὶ πάροδον.

<sup>26</sup> Thucydides, ii. 93, ἐδόκει δὲ λαβόντα τῶν ναυτῶν ἑκάστον τὴν κώπην καὶ τὸ ὑπὲρσειον καὶ τὸν τροπῳτήρα περὶ ἑνὶ ἐκ Κορίνθου ἐπὶ τὴν πρὸς Ἀθήνας θάλασσαν, καὶ ἀφικομένους κατὰ τάχος ἐς Μέγαρα, καθελκύσαντας ἐκ Νισίας τοῦ νηωρίου αὐτῶν τεσσαράκοντα ναῦς αἱ ἔτυχον αὐτόθι οἰσαι, πλεῦσαι εὐθὺς ἐπὶ τὸν Πειραιᾶ.

<sup>27</sup> Thucydides, iv. 67, ἀκάτιον ἀμφηρικὸν ὡς λησται εἰώθεσαν ἐπὶ ἀμάξῃ διὰ τῆς τάφρου κατακομίζειν τῆς νυκτὸς ἐπὶ τὴν θάλασσαν καὶ ἐκπλεῖν, cf. Leonidas of Tarentum, in the Anthology, vi. 4. 6, καὶ τοὺς ἐξ ἀκάτων διχθαδίους ἐρέτας. Lucian, Charon, 1, ἐγὼ δὲ πρεσβύτης ὢν τὴν δικωπλίαν ἐρέτῳ μόνος. Aristophanes, ecclesiazusæ, 1091, πῶς οὖν δικωπεῖν ἀμφοτέρας δυνήσομαι; Synesios, epistolæ, p. 165, ἦκεν ἐπὶ κελητρίου δισκάλμου. Cicero, de oratore, i. 38, citius hercule is, qui duorum scalmorum naviculam in portu everterit, in Euxino ponto Argonautarum navem gubernavit. Livy, xxiv. 40, legati venerunt nuntiantes Philippum primum Apolloniam tentasse, lembis biremibus centum viginti flumine adverso subvectum, deinde etc., cf. Virgil, georgics, i. 201, 202, qui adverso vix flumine lembum | remigiis subigit.

there certainly was not any space for them below. As for the other hundred and seventy oars, sixty-two of these belonged to the upper bank, and fifty-four to each of the lower banks: yet fifty-eight, as the mean between fifty-four and sixty-two, would naturally be the number of oars for the middle bank. In the earliest two-banked ships with a hundred and eighteen rowers<sup>30</sup> there clearly were fifty-eight in the lower bank and sixty in the upper bank, the lower oars being inserted in the spaces between the tholes on a sixty-oared ship. Apparently two oars were added, whereby the upper bank obtained four oars more than the bank below, and then a third bank was added with four oars less than the bank above; a three-banked ship therefore requiring a hundred and seventy-four rowers. And the Athenians perhaps found afterwards that more hands were needed for other purposes, and diminished the number of rowers rather than increase the crew and thereby complicate their estimates for pay; for with a crew of exactly two hundred men a talent a month a ship gave a drachm a day a man, thirty mnas a month a ship gave three obols a day a man, and so forth<sup>31</sup>.

<sup>30</sup> Corp. Inscr. Attic. vol. ii, no. 797, col. a, ll. 17—24, col. b, ll. 6—13, 24—31, col. c, ll. 39—46, no. 798, col. a, ll. 10—17, 27—34, col. b, ll. 18—25, no. 800, col. a, ll. 52—59, giving a total of two hundred oars in the last seven instances, κῶπαι θρανίτιδες ΑΔΙΙ, ῥύγαι ΑΙΙΙΙ, θαλάμαι ΑΙΙΙΙ, περίνευ ΔΔΔ, and doubtless in the first instance also, although the mason has there cut ΑΔΙΙΙΙ for ΑΔΙΙ, presumably by repetition of the ΙΙΙΙ from the ends of the adjacent lines. The full numbers occur elsewhere in the extant fragments of the inventories, but not in groups that give a total. Lower numbers often occur, as many oars were missing.

<sup>31</sup> Thucydides, i. 10, αὐτερέται δὲ ὅτι ἦσαν καὶ μάχιμοι πάντες, ἐν ταῖς Φιλοκτήτου ναυσὶ ("Ὀμηρος) δεδήλωκεν· τοξότας γὰρ πάντας πεποίηκε τοὺς προσκώπους. περίνεως δὲ οὐκ εἰκὸς πολλοὺς ξυμπλεῖν ἔξω τῶν βασιλέων καὶ τῶν μάλιστα ἐν τέλει. cf. Procopios, de bello Vandalico, i. 11, quoted in note 45 on p. 17. Dion Cassius, xlix. 1, καὶ τοὺς δούλους τοὺς τριηρίτας ἡλευθέρωσε, τοὺς τε περίνεως ἐς τὸ τοῦ Ἀρτανίου ναυτικὸν ὀλιγανδροῦν κατέταξεν.

<sup>30</sup> Iliad, ii. 509, 510, already quoted in note 5 on p. 3.

<sup>31</sup> Thucydides, vi. 31, τοῦ μὲν δημοσίου δραχμὴν τῆς ἡμέρας τῇ ναύτῃ ἐκάστῳ δίδοντας καὶ ναὺς παρασχόντας καὶνὰς ἐξήκοντα μὲν ταχείας τεσσαράκοντα δὲ ὀπιταγωγούς, cf. 8, ἐξήκοντα τάλαντα ἀσήμευ ἀργυρίου ὥς ἐς ἐξήκοντα ναὺς μηνὸς μισθόν. Xenophon, Hellenica, i. 5. 5—7, ὁ δὲ (Κῦρος) καλῶς μὲν ἔφη αὐτοὺς λέγειν, οὐ δυνατόν δ' εἶναι παρ' αὐτοῖς βασιλεὺς ἐπέστελεν αὐτῷ ἄλλα ποιεῖν. εἶναι δὲ καὶ τὰς

The number of oars in the four-banked ships is nowhere recorded: but in the inventories of the Athenian dockyards a complete set is valued at six hundred and sixty-five drachms. If every bank was intended to contain four oars more than the bank below, a four-banked ship could carry sixty-six oars in her upper bank; and, including thirty *perineoi*, would thus have two hundred and sixty-six altogether. This number gives exactly two drachms and a half for each oar, while the neighbouring numbers give improbably complicated prices: and that price seems highly probable, for condemned oars were then being sold for two drachms apiece, and timbers bought for three drachms apiece to make new oars<sup>32</sup>. The five-banked ships in the Roman and Carthaginian fleets in 256 B.C. each carried three hundred rowers besides the combatants<sup>33</sup>. With fifty-four oars in the lowest bank and four more in each succeeding bank, a five-banked ship would have three hundred and ten oars in the banks, and therefore three hundred rowers approximately—or perhaps exactly, if here

συνθήκας οὕτως ἐχούσας, τριάκοντα μῶς ἐκάστη νηὶ τοῦ μηνὸς δίδοναι, ὅπως αὖ βούλωνται τρέφειν Λακεδαιμόνιοι. ὁ δὲ Λύσανδρος τότε μὲν ἐσιώπησε· μετὰ δὲ τὸ δεῖπνον, ἐπεὶ αὐτῷ προπιῶν ὁ Κῦρος ἤρετο τί αὖ μάλιστα χαρίζοιτο ποιῶν, εἶπεν ὅτι εἰ πρὸς τὸν μισθὸν ἐκάστῃ ναύτῃ ὀβολὸν προσθείη. ἐκ δὲ τούτου τέτταρες ὀβολοὶ ἦν ὁ μισθός, πρότερον δὲ τριῶβολον.

<sup>32</sup> Corp. Inscr. Attic. vol. ii, no. 809, col. c, ll. 210—214, παρὰ Νεοπτολέμου Δεκελῆως ταβροῦ τετρηριτικοῦ ἀπελάβομεν ΠΗΠΔΓ, ὃν ἔλαβεν ἐπὶ τὴν Σειρήνα, Ἀριστοκράτους ἔργον, ll. 215—225, παρὰ Λυσανίου Σουνιέως...ταβροῦ ἀργοῦ, ὃν οὐκ ἀνεγέγραπτο ἔχων, ὃν εἶχεν ὦν Δημάδης εἰσεπρίατο, ἀπελάβομεν ΗΗΗΗΔΓ, cf. col. b, ll. 115, 116, ταβροὺς ἐπὶ τετρήρεις, οὗς Δημάδης εἰσεπρίατο. The first payment is apparently in full; but the second must be merely on account, the round sum of 250 drachms remaining due, for the oars would be worth more than 415 drachms, even when condemned. Corp. Inscr. Attic. vol. ii, no. 803, col. c, ll. 129—139, Εὐθυνοῦς Λαμπιτρεῦς, ταμίης γενόμενος τριηροποικῶν ἐπὶ Ἀρχίου ἀρχοντος, XXXΠΗ, ἀπολαβὼν κώπας παρ' ἡμῶν ἐκ τοῦ νωριῦ τοῦ παραδοθειῶν, ὦν αὐτὸς εἰσήνεγκεν, ἄδοκιμους χιλίας ὀκτακοσίας, no. 811, col. c, ll. 122—128, τοὺς τῶν νωριῶν ἐπιμελητὰς τοὺς ἐφ' Ἡγησίου ἀρχοντος ἀναγράψαι Σώπολιν ἀποδεδωκτά τῶν κωπέων ἐκάστου ΠΠ δραχμὰς τῶν εἰσηνεγμένων αὐτῷ εἰς τὸ νωρίον. These κωπεῖς were κώπαι in the rough.

<sup>33</sup> Polybios states that 330 Roman ships fought 350 Carthaginian ships at the battle of Ecnomus in 256 B.C., and that these were five-banked ships, i. 25, Ῥωμαῖοι μὲν τριάκοντα καὶ τριακοσίαις μακραίς ναυσὶ καταφράκτοις, Καρχη-

again some of the banks were not fully manned. Subsequently the rowers in such five-banked ships were reckoned roughly at four hundred<sup>34</sup>. And an increase in the number of oars was certainly to be expected: for under that system of constructing every bank for four oars more than the bank below, the lower banks would prove disproportionately short in ships of ten or sixteen banks; so that some new system would be devised for these larger ships, and then applied in course of time to the five-banked ships and possibly to the three-banked ships themselves. Nothing is known for certain about the number or arrangement of the oars in ships of more than five banks. It is said that as early as 280 B.C. there was an eight-banked ship in the fleet of Heracleia on the Black Sea with a hundred rowers in each file, and consequently eight hundred on each side, or sixteen hundred altogether. Thus, at least, Photios transcribes Memnon: but the multiplication of the numbers reads like a gloss of his own; and these files must be the banks themselves, not the lines of

δόνιοι δὲ πεντήκοντα καὶ τριακοσίαις ναυσὶ καταφράκτοις, i. 63, μικρῶ λείπουνσι ἑπτακοσίαις σκάφεσι πεντηρικοῖς ἐναυμάχησαν πρὸς ἀλλήλους. He calculates that the Romans had about 140,000 men afloat, reckoning 300 rowers and 120 combatants for each ship, i. 26, καὶ τὸ μὲν σύμπαν ἦν στράτευμα τούτων τῆς ναυτικῆς δυνάμεως περὶ τέτταρας καὶ δέκα μυριάδας· ὡς ἂν ἐκάστης ἰδίᾳ νεὺς λαμβανοῦσης ἐρέτας μὲν τριακοσίους, ἐπιβάτας δὲ ἑκατὸν εἴκοσι. And he estimates that the Carthaginians had over 150,000 men afloat, judging by the number of their ships, i. 26, τὸ γε μὴν πλῆθος αὐτῶν ἦν ὑπὲρ πεντεκαίδεκα μυριάδας, κατὰ τὸν τῶν νεῶν λόγον. He therefore reckons a Carthaginian crew at practically the same figure as a Roman crew.

<sup>34</sup> Pliny, xxxii. 1, *cum e tota classe quinqueremis sola non proficeret, exsiliuntibus protinus qui quærerent circa navem, invenere (auspicalem pisciculum) adhaerentem gubernaculo, ostenderuntque Gaio, indignanti hoc fuisse quod se revocaret, quadringentorumque remigum obsequio contra se intercederet.* cf. Silius Italicus, xiv. 384—388, *medias inter sublimior ibat | terribilis visu puppis, qua nulla per omne | egressa est Libycis maior navalibus ævum: | nam quater hæc centum numeroso remige pontum | pulsabat tonsis.* Silius and Pliny were contemporary: but Pliny is speaking of a ship of 40 A.D., and Silius of a ship of 212 B.C. The Romans captured a seven-banked ship from the Carthaginians at the battle of Mylæ in 260 B.C.; and Silius must have known this, for the capture is recorded on the Columna Rostrata of Duilius: see Corp. Inscr. Latin. vol. i, no. 195. Silius is therefore allowing 400 rowers for a ship of seven banks at least: and this allowance seems too small, seeing that there were then 300 rowers on a ship of five banks.



rowers, for a bank of two hundred oars is beyond belief<sup>35</sup>. On the forty-banked ship, if Callixenos may be believed, there were about four thousand rowers; and therefore upon the average a hundred rowers for every bank of oars<sup>36</sup>. In both these cases the total seems to be deduced from a statement that there were a hundred oars in every bank: and such statements might not be strictly true, for ships of a single bank were sometimes said grandiloquently to have a hundred oars, although they never had more than fifty or sixty<sup>37</sup>.

The two hundred oars of an Athenian three-banked ship were reduced to sixty when she was employed as a transport for cavalry. She then carried thirty horses; or a horse for each of the thirty spaces between the tholes of the upper bank<sup>38</sup>. The hold being now required for the horses, the oars in the banks could not be worked for want of space, and the oars above the upper decking would alone be avail-

<sup>35</sup> Memnon, Fr. 13, apud Photium, p. 226, ἦσαν δ' ἐν αὐταῖς ἄλλαι τε καὶ τῆς Ηρακλείας αἱ μετὰ πεμπτοί, ἐξήρεις τε καὶ πεντήρεις καὶ ἀφρακτοί, καὶ ὀκτῆρης μία ἡ Λεοντοφόρος καλουμένη, μεγέθους ἕνεκα καὶ κάλλους ἤκουσα εἰς θαῦμα· ἐν ταύτῃ γὰρ ἑκατὸν μὲν ἄνδρες ἑκαστον στοῖχον ἤρεττον, ὡς ὀκτακοσίους ἐκ θατέρου μέρους γενέσθαι, ἐξ ἑκατέρων δὲ χίλους καὶ ἑξακοσίους, οἱ δὲ ἀπὸ τῶν καταστρωμάτων μαχησόμενοι χιλοὶ καὶ διακόσιοι, καὶ κυβερνήται δύο. The sixteenth book of Memnon's history ended with 46 B.C., and that book was not the last, cf. Photios, pp. 239, 240; so he probably lived some generations later. Photios made his transcript about 850 A.D. He clearly takes στοῖχος to mean a line of rowers; but in the passage quoted in note 43 on p. 16, Aristides uses στοῖχος to denote a bank of oars, and he was probably a contemporary of Memnon. The credibility of the figures is not enhanced by the statement about the combatants. A ship of eight banks would hardly carry 1200 at a time when ships of five banks carried only 120: see note 33.

<sup>36</sup> Athenæos, v. 37, and Plutarch, Demetrius, 43, both quoted already in note 20 on p. 8.

<sup>37</sup> Pollux, i. 82, ἑκατόντορος, πενηκόντορος, τριακόντορος, εἰκόσιορος. The term ἑκατόντορος must refer, like the rest, to ships of a single bank: but there is no ground for thinking that such ships ever had an hundred oars.

<sup>38</sup> Thucydides, vi. 43, καὶ ἡπαγωγῇ μὲν τριάκοντα ἀγούσῃ ἡπείας. This was in 415 B.C. The same arrangement may perhaps be traced in the navy of the kings of Pergamos in 168 B.C. Livy, xlv. 28, mentions *quinque et triginta naves, quas hippagogos vocant, cum equitibus Gallis equisque*, and then says *octingenti ferme Gallorum occisi, ducenti vivi capti*, clearly meaning that they were all killed or captured. He therefore reckons them roughly as a thousand: and they would have numbered a thousand and fifty, if those thirty-five ships carried thirty apiece.

able: so the *perineōi* oars must have been doubled in number, while the rest were withdrawn<sup>39</sup>. Superannuated three-banked ships were first utilized as cavalry-transports at Athens in 430 B.C.; transports having previously been expressly built for cavalry<sup>40</sup>.

Some anomalous ships termed *hemioliai* and *triemioliai* are first mentioned about 350 B.C., and thereafter frequently. These would technically be ships of a bank and a half, but must really be two-banked ships of an abnormal type. In the contemporary three-banked ships the men described as *perineōi* rowed an additional half-bank of oars from above the upper decking, and could presumably do likewise in two-banked ships of the same build: but if the build made this impossible, they would have to man half an ordinary bank; and their oars would not count in numbering the banks, since they were *perineōi*. Thus, as three practically meant three and a half, one and a half would practically mean two<sup>41</sup>.

<sup>39</sup> Corp. Inscr. Attic. vol. ii, no. 807, col. b, ll. 42—66, *τρίρεις τάσδε ἰππηγούς*,... Γνώμη—κώπας  $\Delta$ ,... Ἀσκληπιδῆς—κώπας  $\Delta$ ,... Καλλιζένα—κώπας  $\Delta$ , no. 808, col. b, ll. 8, 9, *καὶ ἰππηγῶν τριῶν ταβρύους, κώπας ἐκάστης*  $\Delta$ .

<sup>40</sup> Thucydides, ii. 56, ἦγε δὲ (Περικλῆς) ἐπὶ τῶν νεῶν ὅπλιντας Ἀθηναίων τετρακισχιλούς, καὶ ἰππέας τριακοσίους ἐν ναυσὶν ἰππαγωγῶς πρῶτον τότε ἐκ τῶν παλαιῶν νεῶν ποιηθείσας. Herodotos, vi. 95, παρεγένοντο δὲ καὶ αἱ ἰππαγωγοὶ νέες, τὰς τῷ προτέρῳ ἔτει προῖπε τοῖσι ἐώντοῦ δασμοφόροισι Δαρείος ἐτομάζειν, cf. 48, κελύων νέας τε μακρὰς καὶ ἰππαγωγὰ πλοῖα ποιεῖσθαι.

<sup>41</sup> Theophrastus, characteres, 25. 1; Arrian, anabasis, iii. 2. 4, vi. 1. 1, 18. 3; Diodoros, xvi. 61. 4, xix. 65. 2, xx. 93. 3; Polybios, v. 101. 2, xvi. 2. 10, 3. 4, 3. 14, 7. 1, 7. 3; Appian, de rebus Punicis, 75, de bello Mithridatico, 92; etc. The term ἡμιολία rightly describes one and a half as a whole and a half: but the term τριημιολία seems formed on false analogy with words like τριημιπόδιον, which describe one and a half as three halves, the ὅλ in τριημιολία being thus ignored. The form τριημιολίας occurs in Athenæos, v. 36, τὰ δ' ἀπὸ τετρήρους μέχρι τριηριημιολίας, but is plainly a corruption from τρήρεις and ἡμιολίας which occur in the parallel passage, Appian, præfatio, 10, τρήρεις δ' ἀπὸ ἡμιολίας μέχρι πεντήρους, where τρήρεις is used as a generic term for war-ships. The existence of three banks of oars on the τριημιολίαι is not to be inferred from Polybios, xvi. 3, ὑποπεσούσης γὰρ αὐτῇ (τῇ δεκτῇ) τριημιολίας, ταύτῃ δοῦσα πληγὴν βίαιαν κατὰ μέσον τὸ κύτος ὑπὸ τὸν θρανίτην σκαλῶν, ἐδέθη, τοῦ κυβερνήτου τὴν ὁρμὴν τῆς νεὼς οὐκέτι δυνηθέντος ἀναλαβεῖν. The expression θρανίτης σκαλμός would certainly refer to the upper bank on a three-banked ship: but it would also refer to the upper bank in any ship with more than one. Thus Athenæos speaks of the longest oars in the forty-banked ship as κώπας θρανιτικὰς, v. 37.

The Liburnians used to build very handy two-banked ships for their irregular warfare in the Adriatic; and soon after 50 B.C. the Romans took these as models for their own two-banked ships<sup>42</sup>. This type may perhaps be recognized in the Roman two-banked ship in fig. 25. The Greeks had made *trieres*, a three-banked ship, a generic term for war-ships<sup>43</sup>, though some had more banks than three and some had less. And in course of time the Romans made *liburna*, a two-banked ship, a similar generic term; applying it indiscriminately about 400 A.D. to war-ships of every rate from those of one bank to those of five banks—for apparently they still had such ships in the West, though in the East their largest war-ships were merely of two banks<sup>44</sup>. But about 500 A.D. the Byzan-

<sup>42</sup> Appian, de rebus Illyricis, 3, καὶ ναυτικοὶ μὲν ἐπὶ τοῖς Ἀρδιαλοῖς ἐγένοντο Λιβυρνοί, γένος ἕτερον Ἰλλυριῶν, οἱ τὸν Ἰόνιον καὶ τὰς νήσους ἐλήσπευον ναυσὶν ὠκείαις τε καὶ κοῦφαις. ὅθεν ἔτι νῦν Ῥωμαῖοι τὰ κοῦφα καὶ ὀξεῖα δίκροτα Λιβυρνίδας προσαγορεύουσιν. See also note on *lembi* on p. 115 as to the style of shipbuilding adopted in Illyria. The employment of Liburnian ships in Roman fleets is mentioned by Cæsar, de bello civili, iii. 5, 9, in 48 B.C. and by Horace, epodes, i. 1, in 31 B.C.; and subsequently by Lucan, iii. 534, with reference to 49 B.C. These ships never had ten banks of oars: the reading *deceris* is merely a foolish emendation for *de cedris* in Suetonius, Caligula, 37, *fabricavit et de cedris Liburnicas gemmatis puppibus, versicoloribus velis*, etc. There were only two banks, Lucan, iii. 529—536, *cornua Romanæ classis, validaeque triremes*, | *quasque quater surgens exstructi remigis ordo* | *commovet, et plures que mergunt æquore pinus*, | *multiplices cinxere rates. hoc robur aperto* | *oppositum pelago. lunata fronte recedunt* | *ordine contenta gemino crevisse Liburnæ*. | *celsior at cunctis Bruti prætoria puppis* | *verberibus semis agitur*. Thus in inscriptions the Romans described ships as six-banked, five-banked, four-banked, three-banked, and Liburnian: see Corp. Inscr. Latin. vol. x, index, p. 1128, *naves*.

<sup>43</sup> Appian, præfatio, 10, τριῆρεις δὲ ἀπὸ ἡμολλίας μέχρι πεντήρους. Ælius Aristides, Rhodiaca, p. 341, τριῆρεις δ' ἐπὶ τούτοις ὑπῆρχεν ἰδεῖν δικρότους καὶ τρικρότους καὶ ἐς ἑπτὰ καὶ ἐς ἑννέα στοίχους.

<sup>44</sup> Vegetius, iv. 37, *quod ad magnitudinem pertinet, minimæ liburnæ remorum habent singulos ordines, paulo maiores binos, idoneæ mensura ternos vel quaternos interdum quinos sortiuntur remigio gradus. nec hoc cuiquam enorme videatur, cum in Actiaco prælio longe maiora referantur concurrisse navigia, ut senorum etiam vel ultra ordinum fuerint*. But this usage is not adopted by his contemporary, Zosimos, v. 20, ἐπεμελεῖτο δὲ (Φραουῖτος) καὶ τοῦ ναυτικοῦ· πλοῖα γὰρ ἦν αὐτῷ πρὸς ναυμαχίαν ἀρκοῦντα, Λίβερνα ταῦτα καλούμενα, ἀπὸ τινος πόλεως ἐν Ἰταλίᾳ κειμένης ὀνομασθέντα, καθ' ἣν ἐξ ἀρχῆς τούτων τῶν πλοίων τὸ εἶδος ἐναυπηγήθη. δοκοῦσι δὲ πῶς τὰ πλοῖα ταῦτα ταχυναντεῖσθαι πεντηκοντῶρων οὐχ ἦπτον, κατὰ πολὺ τῶν τριηρικῶν ἐλαττούμενα, πλεῖστοις ἔτεσι τῆς τούτων ἐκλιπούσης

tines introduced *dromon* as a generic term for war-ships, calling them racers in allusion to their superiority to merchant-ships in speed. In the Byzantine fleet at this time they were ships of a single bank, but those built in Italy for the fleet at Ravenna were three-banked ships<sup>45</sup>. Unfortunately, the contemporary mosaic at Ravenna in fig. 39 represents the fleet in the harbour there very unintelligently.

The arrangement of the oars in Byzantine war-ships is clearly described in a treatise attributed by tradition to Leo VI., but apparently reduced to its present form during the reign of his son and successor Constantine VII. No ship had more than two banks of oars. Every two-banked ship had at least twenty-five oars on each side of each bank, or a hundred

δημουρίας, εἰ καὶ Πολύβιος ὁ συγγραφεὺς ἐκτίθεσθαι πως ἔδοξε τῶν ἐξηρικῶν πλοίων τὰ μέτρα, οἷς φαίνονται πολλάκις Ῥωμαῖοι καὶ Καρχηδόνιοι πολεμήσαντες πρὸς ἀλλήλους. Zosimos obviously is describing two-banked ships as πλοῖα Δίβερνα, just as he describes three-banked ships as πλοῖα τριηρικὰ and ships of a single bank as πετηκόντοροι, his notion being simply that ships of two banks are superior to ships of one bank but inferior to ships of three banks. The vague usage is sanctioned by Tacitus, *Germania*, 9, *signum ipsum in modum liburnæ figuratum*, i.e. *Isidis navigium*. And by Pliny, ix. 5, *ceu liburnicarum rostris fodiunt*, ix. 47, *liburnicarum ludens imagine*, x. 32, *liburnicarum modo, rostrato impetu feruntur*, xvi. 17, *liburnicarum ad usus*. Tacitus and Pliny clearly are treating the Liburnians as a representative class of ships; for in these comparisons nothing turns on any peculiarity in the build.

<sup>45</sup> Procopius, *de bello Vandalico*, i. 11, ἦσαν δὲ αὐτοῖς καὶ πλοῖα μακρά, ὡς ἐς ναυμαχίαν παρεσκευασμένα, ἐνεθήκοντα δύο, μονήρη μέντοι καὶ δροφὰς ὑπερθεῖν ἔχοντα, ὅπως οἱ ταῦτα ἐρέσσοντες πρὸς τῶν πολεμίων ὡς ἥκιστα βάλλοιτο. δρόμους καλοῦσι τὰ πλοῖα ταῦτα οἱ νῦν ἄνθρωποι· πλεῖν γὰρ κατὰ τάχος δύνανται μάλιστα. ἐν τούτοις δὴ Βυζάντιοι δισχιλιοὶ ἔπλεον, αὐτερέται πάντες· περίπλεως γὰρ ἦν ἐν τούτοις οὐδὲς. This certainly does not imply that these ninety-two ships carried only two thousand rowers altogether, or hardly more than twenty rowers apiece. The point is that the two thousand Byzantines helped to row the ships, though normally exempted from this drudgery as combatants. Leo, *tactica*, xix. 1, ἐπὶ θαλάσσης μάχεσθαι διὰ τῶν ποτε λεγομένων τριήρων, νῦν δὲ δρομῶν καλουμένων. Cassiodorus, *epistolæ varæ*, v. 16, *cum nostrum igitur animum frequens cura pulsaret naves Italiam non habere, decrevimus mille interim dromones fabricandos assumere*. 17, *renuntias illico completum quod vix credi poterat inchoatum. obtulisti oculis nostris subito classem silvam hominum, domos aquatiles, exercitiales pedes: trireme vehiculum, remorum tantum numerum prodens sed hominum facies diligenter abscondens*—*hoc primum instituisse legimus Argonautas...ad urbem Ravennatam congregatio navium cuncta conveniat*. Both those despatches are from Theodoric to Abundantius. For the expression *trireme vehiculum*, cf. Paulinus Nolanus, *poemata*, xxiv. 72, *quadrivemis machina*.

altogether; and each oar was worked by one man. The two-banked ships were of two sizes. The smaller carried at least a hundred men for rowing and fighting. The larger carried at least two hundred men; and in action fifty rowed in the lower bank, while a hundred and fifty fought above<sup>46</sup>. Ships of this type were employed by Constantine VII. for an attack on Crete in 949 A.D. The smaller had a company of a hundred and eight or ten men; and the larger had a double company of two hundred and twenty men with one hundred and twenty oars. But ships of another type were also employed: the smaller carrying a hundred and twenty men, and the larger a hundred and fifty<sup>47</sup>. As a hundred men sufficed for two banks of oars, these ships presumably were also of two banks. Ten men more were carried on the ships of this type that were employed by Leo VI. for an attack on Crete about 906 A.D.; or a hundred and thirty in the smaller, and a hundred and sixty in the larger. The larger ships of the other type were also employed, but not the smaller. They also carried ten men more at that time, or two hundred and

<sup>46</sup> Leo, *tactica*, xix. 7, ἕκαστος δὲ τῶν δρομώνων εὐμήκης ἔστω καὶ σύμμετρος, ἔχων μὲν τὰς λεγομένας ἐλασίας δύο, τὴν τε κάτω καὶ τὴν ἄνω. 8, ἐκάστη δὲ ἔχέτω ζυγούς τὸ ἐλάχιστον πέντε καὶ ἑκοσιν, ἐν οἷς οἱ κωπηλάται καθεσθῆσονται. ὡς εἶναι ζυγούς τοὺς ἅπαντας κάτω μὲν ἑκοσι καὶ πέντε, ἄνω δὲ ὁμοίως ἑκοσι καὶ πέντε, ὁμοῦ πεντήκοντα· καθ' ἓνα δὲ αὐτῶν δύο καθεζέσθωσαν οἱ κωπηλατοῦντες, εἰς μὲν δεξιὰ, εἰς δὲ ἀριστερά. ὡς εἶναι τοὺς ἅπαντας κωπηλάτας ὁμοῦ (καὶ τοὺς αὐτοὺς καὶ στρατιώτας) τοὺς τε ἄνω καὶ τοὺς κάτω ἄνδρας ἑκατόν. 9, καὶ ἕτεροι δὲ δρόμωνες κατασκευαζέσθωσαν σοι τούτων μείζονες, ἀπὸ διακοσίων χωροῦντες ἀνδρῶν (ἢ πλείω τούτων ἢ ἐλάττω κατὰ τὴν χρεῖαν τὴν δέουσαν ἐπὶ καιροῦ κατὰ τῶν ἐναντίων) ὧν οἱ μὲν πεντήκοντα τὴν κάτω ἐλασίαν ὑπουργήσουσιν, οἱ δὲ ἑκατόν πεντήκοντα ἄνω ἐστῶτες ἅπαντες ἐνοπλοὶ μαχίσονται τοῖς πολεμοῖς.

<sup>47</sup> Porphyrogenitos, de caerimoniis, ii. 45, p. 384, ὁ στρατηγὸς τοῦ Αἰγαίου πελάγους μετὰ χελανδίων παμφύλων 5' ἀνὰ ἀνδρῶν ρκ' καὶ χελανδίων οὐσιακῶν 8' ἀνὰ ἀνδρῶν ρη'· κατελείφθη δὲ καὶ μία οὐσία εἰς τὸ κόψαι τὴν τῆς ὀγδόης Ἰνδικτιονος ζυλὴν. ὁ στρατηγὸς τῆς Σάμου μετὰ χελανδίων παμφύλων 5' ἀνὰ ἀνδρῶν ρν' καὶ χελανδίων οὐσιακῶν 5' ἀνὰ ἀνδρῶν ρη'· ἀπεστάλησαν δὲ μετὰ τοῦ πρωτοπαπαθαρίου Ἰωάννου καὶ ἀσηκρήτης ἐν Ἀφρικῇ χελάνδια γ' καὶ δρόμονες 8' ἀνὰ ἀνδρῶν σκ'. ὁ στρατηγὸς τῶν Κιβυρραίων μετὰ χελανδίων παμφύλων 5' ἀνὰ ἀνδρῶν ρν' καὶ χελανδίων οὐσιακῶν 5' ἀνὰ ἀνδρῶν ρν'· κατελείφθη δὲ καὶ εἰς φύλαξιν τοῦ θέματος πάμφυλοι β', οὐσιακά δ'· κατελείφθη δὲ καὶ εἰς τὸ κόψαι τὴν τῆς ὀγδόης Ἰνδικτιονος ζυλὴν οὐσαι β'. κατελείφθη δὲ καὶ εἰς φύλαξιν τοῦ κυροῦ Στεφάνου τοῦ γυναικαδελφοῦ τοῦ βασιλέως ἐν Ῥόδῳ οὐσία α' καὶ δρομώνων 8' ἀνὰ ἀνδρῶν σκ'. An οὐσία was a company, and the χελάνδια οὐσιακά were ships carrying a company apiece. They carried 108 or 110

thirty, besides seventy others for fighting only and not for rowing; and therefore carried three hundred altogether<sup>48</sup>. As there were more rowers than oars in many of these ships, though every oar was managed by one man, these rowers must have worked by turns.

Thus, after a lapse of sixteen centuries, the system of successive banks was again restricted to two-banked ships with a hundred and twenty oars at most; and soon afterwards it was abandoned. The term *galea* was already applied to war-ships of a single bank<sup>49</sup>: but those new systems were not yet devised, which made the single bank of the mediæval galleys as effective as the numerous banks of the ancient war-ships. One of these new systems increased the number of oars by placing them at shorter intervals along the bank, and making them of several different lengths inboard, the rowers being arranged in several lines along the deck; while the other maintained the number of oars at fifty or sixty, but increased their size and strength, several rowers working together at every oar<sup>50</sup>.

men; so the eight dromons, which each carried 220 men, each carried two companies. Twenty other dromons are explicitly credited with two companies apiece, p. 384, *δρόμονες κ' ἀνὰ οὐσιῶν β' οὐσίαι μ'*. Each therefore carried 220 men: yet only 120 oars, p. 388, *εἰς ἐξόπλισιν τῶν κ' δρομονίων—κωπία ἀνὰ ρκ' ὁμοῦ βν'*.

<sup>48</sup> Porphyrogenitos, de caerimoniis, ii. 44, p. 377, διὰ τοῦ θέματος τοῦ Αἰγαίου πελάγους. δρόμονες ζ' ἔχοντες ἀνὰ ἀνδρῶν κωπηλατῶν σλ' καὶ ἀνὰ πολεμιστῶν ὁ' ὁμοῦ βρ'. πᾶμφυλοι ζ' ἔχοντες οἱ μὲν γ' ἀνὰ ἀνδρῶν ρξ', οἱ δὲ ἑτεροὶ δ' ἀνὰ ἀνδρῶν ρλ' ὁμοῦ ρα. ὁμοῦ τὸ πᾶν διὰ τοῦ θέματος τοῦ Αἰγαίου πελάγους γρ'. cf. ii. 45, p. 387, ὁ δρόμων ὀφείλει ἔχειν ἄνδρας τ', οἱ μὲν σλ' πλόιμοι κωπηλάται ἦτοι καὶ πολεμισταί, καὶ οἱ ἑτεροὶ ὁ' ἄνδρες πολεμισταί. That refers to 949 A.D.: but the ἐξόπλισις δρόμονος α', pp. 386, 387, differs materially from the ἐξόπλισις τῶν κ' δρομονίων, pp. 387, 388, so this dromon had now become anomalous.

<sup>49</sup> Leo, tactica, xix. 10, καὶ ἐτι δὲ κατασκευάσεις δρόμωνας ἐλάττους δρομικωτάτους, οἰονεὶ γαλαίας ἢ μονήρεις λεγομένους. The forms γαλαίαι and γαλέαι were used indifferently at this period.

<sup>50</sup> According to Pantero Pantera, armata navale, i. 15, the big oars were known as *remi di scaloccio*, and were worked by two or three men apiece on the *galeotte*, by three or four and sometimes by five or six on the *galee*, and by as many as eight or even more on the *galeazze*. The big oars were superseding the small oars. These were known as *remi à sensile*, and had usually been worked in groups of three or four or five, with one man for every oar. Pantera was captain of the Papal galleys, and published his work at Rome in 1614.

Merchant-ships were generally too bulky to be propelled by oars. Nevertheless they carried a few, very often twenty<sup>51</sup>: and these probably sufficed for bringing the ship's head round and other such purposes, though hardly numerous enough for driving the ship along. Thus, a merchant-ship trying to make some headway with her oars is compared by Aristotle to an insect feebly buzzing along on wings too small for its body, after the manner of cockchafers and bees: whereas a war-ship under way, rhythmically dipping her vast mass of oars, was commonly compared to a bird upon its flight<sup>52</sup>.

The banks of oars were so arranged that the largest war-ships were of no great height. To shew the size of the great ships in Antony's fleet at the battle of Actium in 31 B.C., Orosius remarks that they actually were ten feet in height above the

<sup>51</sup> Odyssey, ix. 322—324, ὅσσον θ' ἰστὸν νηὸς εἰκοσόροιο μελαίνης, | φορτίδος, εὐρείης, ἥτ' ἐκπερά μ' ἐγὰρ λαΐτμα· | τόσσον ἔην μήκος, τόσσον πάχος εἰσοράσθαι. Demosthenes, in Lacritum, 18, τὰ δὲ τρισχίλια κέραμα ἀγεσθαι ταῦτα εἰς τὸν Πόντον ἐν τῇ εἰκοσῶν ἦν Ἰβλήσιος ἐναυκλήρει. Athenæus, v. 41, ἦν δ' ἡ ναὺς τῇ μὲν κατασκευῇ εἰκοσόρος, κ.τ.λ., cf. 40, πλοῖα σιτηγὰ κατασκευαζόμενος, ὧν ἐνδὸς τῆς κατασκευῆς μνησθήσομαι.

<sup>52</sup> Aristotle, de animalium incessu, 10, βραδεῖα δ' ἡ πτήσις τῶν ὀλοπτέρων ἐστὶ καὶ ἀσθενὴς διὰ τὸ μὴ κατὰ λόγον ἔχειν τὴν τῶν πτερῶν φύσιν πρὸς τὸ τοῦ σώματος βάρος, ἀλλὰ τὸ μὲν πολὺ, τὰ δὲ μικρὰ καὶ ἀσθενῆ· ὥσπερ ἂν οὖν εἰ ὀλκαδικὸν πλοῖον ἐπιχειροῖη κώπαις ποιεῖσθαι τὸν πλοῦν, οὕτω ταῦτα τῇ πτήσει χρήται. ὑπερναντίως δ' ἔχουσιν οἱ ὀρνιθες τοῖς ὀλοπτέροις τὴν τῶν πτερῶν φύσιν, κ.τ.λ. The metaphor about the birds occurs frequently. Odyssey, xi. 124, 125, οὐδ' ἄρα τοίγ' ἴσασι νέας φοινικοπαρήους, | οὐδ' εὐήρε' ἔρετμά, τάτε πτερὰ νηυσὶ πέλονται. Euripides, Troades, 1085, 1086, ἐμὲ δὲ πόντιον σκάφος | ἀίσσον πτεροῖσι πορεύσει. Æschylos, Agamemnon, 52, πτερύγων ἔρετμοῖσιν ἔρεσσόμενοι, sc. ἀλγύπιοι. Polybios, i. 46, αἱ δὲ νῆες ἐπείχον, ἐκπερωκύναι πρὸς τὴν ἐμβολήν. Plutarch, Antonius, 63, τοὺς δὲ ταροῦς τῶν νεῶν ἐγέλρας καὶ πτερώσας ἐκατέρωθεν. Moschos, ii. 59, 60, ὀρνις, ἀγαλλόμενος πτερύγων πολυανθεί χροίῃ, | ταρσὰ δ' ἀναπλώσας, ὥσε' τέ τις κύκαλος νηὺς. Also in Latin. Virgil, Æneid, i. 300, 301, volat ille per aera magnum | remigio alarum. Propertius, iv. 6. 47, 48, nec te, quod classis centenis remigat alis, | terreat. But this does not please Quintilian, viii. 6. 18.

<sup>53</sup> Orosius, vi. 19, classis Antonii centum septuaginta navium fuit, quantum numero cedens tantum magnitudine præcellens, nam decem pedum altitudine a mari aberant. This definite statement deserves more attention than the grotesque exaggerations of Virgil, Æneid, viii. 691, 692, ꝑꝑꝑꝑꝑꝑ credas innare revulsas | Cycladas, aut montes concurrere montibus altos. The notion of an encounter with islands is neatly parodied by Lucian, veræ historiæ, i. 40—42; but is adopted with some apology by Dion Cassius, l. 33, εἰκασεν ἂν τις ἰδὼν τὰ γυγνόμενα, ὥς μικρὰ μεγάλοις ὁμοιωσαι, τελχεσὶ τισιν ἢ καὶ νήσοις πολλαῖς καὶ πυκναῖς ἐκ θαλάσσης

water-line<sup>53</sup> : and these great ships were of ten banks<sup>54</sup>. He therefore allows a foot of freeboard for each bank of oars ; and thus would make a sixteen-banked ship only sixteen feet in height above the water-line. And practically there never were more than sixteen banks on a sea-going ship.

A ship of a single bank, which was preserved at Rome as a relic of Æneas, was a hundred and twenty feet in length<sup>55</sup> : and as she probably was a fifty-oared ship, there probably were twenty-five oars on each side, and therefore twenty-four spaces between the tholes, or one such space for every five feet of her length. And this relation would not be fortuitous ; for in ancient ships all the dimensions were related to the interval between the tholes<sup>56</sup>. A thirty-oared ship, with fourteen such spaces, would thus be seventy feet in length ;

πολιορκουμένας. The tamer notion of an encounter with forts seems due to Plutarch, Antonius, 66, where he compares the battle to a *τειχομαχία*, apparently in imitation of the common-place in Latin that war-ships were like walled towns. Thus, the expression *urbis instar* is applied to a four-banked ship by Cicero, in Verrem, ii. v. 34, and the expression *urbis opus* to a three-banked ship by Virgil, Æneid, v. 119.

<sup>54</sup> Plutarch, Antonius, 64, *ὥς δὲ ναυμαχεῖν ἐδέδοκτο, τὰς μὲν ἄλλας ἐνέπηρσε ναῦς—πλήν ἐξήκοντα τῶν Αἰγυπτίων—τὰς δὲ ἀρίστας καὶ μεγίστας ἀπὸ τριήρους μέχρι δεκήρους ἐπλήρου*. Dion Cassius, l. 23, *τριήρεις μὲν γὰρ ὀλίγαι, τετρήρεις δὲ καὶ δεκῆρεις καὶ τὰ λοιπὰ τὰ διὰ μέσου πάντα ἐξεποίησεν*. Strabo, vii. 7. 6, *ἀνέθηκε Καῖσαρ τὴν δεκαναῖαν ἀκροθίνιον ἀπὸ μονοκρότου μέχρι δεκῆρους*.

<sup>55</sup> Procopios, de bello Gothico, iv. 22, *ἔτι μέντοι καὶ ὅσα μνημεῖα τοῦ γένους ἐλείπτο ἔτι, ἐν τοῖς καὶ ἡ ναὺς Αἰνέλου, τοῦ τῆς πόλεως οἰκιστοῦ, καὶ εἰς τόδε κεῖται, θέαμα παντελὺς ἀπίστον. νεώσοικον γὰρ ποιησάμενοι ἐν μέσῃ τῇ πόλει παρὰ τὴν τοῦ Τιβέριδος ὁχθρὴν, ἐνταῦθα τε αὐτὴν καταθέμενοι, ἐξ ἐκείνου τηροῦσιν. ἥ περ ὅποια ποτὲ ἔστιν αὐτὸς θεασάμενος ἐρῶν ἐρχομαι. μονήρης δὲ ἡ ναὺς ἦδε καὶ περιμήκης ἀγαν τυγχάνει οὕσα, μήκος μὲν ποδῶν ἑκοσι καὶ ἑκατόν, εὖρος δὲ πέντε καὶ ἑκοσι, τὸ δὲ γε ὕψος τοσαύτη ἔστιν ὅσον αὐτὴν ἐρέσσεσθαι μὴ ἀδύνατα εἶναι*.

<sup>56</sup> Vitruvius, i. 2. 4, *ut in hominis corpore e cubito pede palmo digito ceterisque particulis symmetros est eurythmiae qualitas, sic est in operum perfectionibus : et primum in ædibus sacris aut e columnarum crassitudinibus aut triglypho aut etiam embate, sed et balliste e foramine, quod Græci PERITRETON vocitant, navis interscalmio, quod DIPHECIACA dicitur, item ceterorum operum e membris invenitur symmetriarum ratiocinatio*. The letters DIPHECIACA seem intended for some Greek word ; and the word *διπηχαική* has been invented for the occasion. If this word had any meaning, it would mean that the interval between the tholes amounted to two cubits, and was therefore a fixed distance : but the distance certainly was variable, since it formed the unit for calculating the dimensions of a ship, and all ships were not alike.



and a three-banked ship, with thirty such spaces in the upper bank, a hundred and fifty feet in length. These dimensions certainly appear excessive. Yet the oars could hardly have been worked, had the interval between the tholes been less than three feet; so the distance from the first thole to the last must have been at least forty-two feet on a thirty-oared ship, seventy-two feet on a fifty-oared ship, and ninety feet on a three-banked ship: and this distance seems little more than three-fifths of the extreme length in most of the ships depicted by the ancients. Moreover, these ships look as though they were clear of the water for fully a fifth of their length by reason of the overhanging stern and the elevated ram. The ship of Æneas was twenty-five feet broad, or more than a fifth of her length in beam: but the Greek war-ships were considerably narrower. The remains of the Athenian docks in the harbour of Zea shew that originally they were quite a hundred and fifty feet in length but only twenty feet in

<sup>57</sup> Plans and measurements of the docks at Zea in the *Πρακτικά τῆς ἐν Ἀθήναις ἀρχαιολογικῆς ἐταιρίας* for 1885, plates 2 and 3, cf. pp. 63—71. The docks themselves are about 19 ft. 5 in. in breadth, or twenty feet by ancient Greek measurement; and they are divided by partitions which are about 1 ft. 11 in. in breadth, so that the distance from centre to centre is about 21 ft. 4 in. In the ruins of the docks at Munychia this distance is about 10 in. less: but possibly the partitions were narrower. All the docks at Zea are in ruins at the lower end: yet some of them are still 144 ft. in length. They certainly were not meant to take two ships apiece, one behind another: there never were double docks, *νεώρια*, though sometimes there were double sheds above the docks, *νεώσοικοι*. Diodoros, xiv. 42, *ὑποδομὴ δὲ (Διονύσιος) καὶ νεώσοικους πολυτελεῖς ἑκατὸν ἐξήκοντα, τοὺς πλείστους δύο ναυὶς δεχομένους*, Plato, *Critias*, p. 116, *τέμνοντες δὲ ἅμα ἀπειργάζοντο νεώσοικους κοίλους διπλοῦς ἐντός, κατηρεφεῖς αὐτῇ τῇ πέτρᾳ*. There are lines of columns between the docks at Zea; and these columns are spaced differently in alternate lines, as if to carry different weights. So these docks undoubtedly were roofed in pairs: but in no other sense were they double.

<sup>58</sup> Athenæos, v. 37, already quoted in note 24 on p. 9. A ship of this length would have 170 oars in the uppermost bank, with 84 spaces between the tholes on either side, if she had one such space for every five feet of her length: and if each bank held four oars more than the bank below, and there were 54 in the lowest bank—see pp. 11 ff.—there would be 170 in the uppermost bank on a ship of thirty banks. The coincidence is curious.

<sup>59</sup> This usage of *μακρά* and *longa* occurs frequently, e.g. Polybios, xxii. 26, *ἀποδότω δὲ καὶ τὰς ναυὶς τὰς μακρὰς καὶ τὰ ἐκ τούτων ἄρμενα καὶ τὰ σκεύη* = Livy, xxxviii. 38, *tradito et naves longas armamentaue earum*, both authors quoting from the treaty under which Antiochos surrendered his navy to the Romans in 189 B.C. There

breadth<sup>57</sup>. These docks presumably were not much longer than the ships for which they were designed, and the ships certainly were not broader than the docks; so these ships could hardly have exceeded two-fifteenths of their length in beam. And this is approximately the ratio of length to breadth which Callixenos ascribes to the alleged forty-banked ship, the length being four hundred and twenty feet and the breadth fifty-seven<sup>58</sup>.

The regular war-ships differed so strikingly from merchant-ships in their proportions that they were generally known as the long ships, while these were known as the round ships<sup>59</sup>. But ships sometimes were constructed on an intermediate system of proportion, and consequently could not thus be classed as long or round<sup>60</sup>. And the round ships were themselves of several different types; while a multitude of types prevailed among the vessels that were not large enough to rank as ships<sup>61</sup>.

was a corresponding usage of *στρογγύλη*. Athenæos, viii. 42, ἐρωτηθεὶς δὲ (Στρατόνικος) ὑπό τινας, τίνα τῶν πλοίων ἀσφαλέστατα ἐστί; τὰ μακρά, ἢ τὰ στρογγύλα; τὰ νενεωλκημένα, εἶπεν. Theophrastos, *historia plantarum*, v. 7. 1, τὰς μὲν γὰρ τριήρεις καὶ τὰ μακρὰ πλοῖα ἐλάτινα ποιοῦσι διὰ κοφύβητα, τὰ δὲ στρογγύλα πεύκινα διὰ τὸ ἀσάπες. Xenophon, *Hellenica*, v. 1. 21, καὶ καταδύειν μὲν οὐκ ἔα στρογγύλον πλοῖον οὐδὲ λυμᾶινεσθαι ταῖς ἐναντῶν ναυσίν· εἰ δὲ που τριήρη ἴδουεν ὁρμούσαν, ταύτην πειρᾶσθαι ἀπλουν ποιεῖν. cf. Herodotos, i. 163, already quoted in note 8 on p. 4. But this usage was not adopted in Latin; and *navis longa* is opposed to *navis oneraria*, just as *ναὺς μακρά* is sometimes opposed to *ὀλκάς*. Cæsar, *de bello Gallico*, iv. 22, *navibus circiter octoginta onerariis coactis contractisque, quot satis esse ad duas transportandas legiones existimabat, quicquid præterea navium longarum habebat, quæstori legatis præfectisque distribuit*. Appian, *de bellis civilibus*, ii. 54, καὶ δύο τελῶν ἄλλων ἐπελθόντων, ὅδε καὶ τότε προσλαβὼν ἀνήγετο χειμῶνος ἐπὶ ὀλκάδων· αἱ γὰρ ἦσαν αὐτῷ νῆες ὀλίγαι μακრაί, Σαρδῶ καὶ Σικελίαν ἐφρούρουν.

<sup>59</sup> Athenæos, v. 38, quoting Callixenos, τὸ δὲ σχῆμ' αὐτῆς οὔτε ταῖς μακραῖς ναυσίν οὔτε ταῖς στρογγύλαις ὀικός, ἀλλὰ παρηλλαγμένον τε καὶ πρὸς τὴν χρεῖαν τοῦ ποταμοῦ τὸ βάθος. Arrian, *Fr.* 19, apud Suidam, s. v. ναὺς:—εἶχε δὲ ἡ ναὺς μήκος μὲν κατὰ τριήρη μάλιστα, εὖρος δὲ καὶ βάθος καθ' ὀλκάδα, ὅσον μεγίστη Νικομηδὺς ἢ Αἰγυπτία. Both these vessels were designed for rivers; the former for the Nile under Ptolemy Philopator, the latter apparently for the Tigris under Trajan. Appian, *de bellis civilibus*, v. 95, ἐδωρήσατο δὲ καὶ Ὀκταουῖα τὸν ἀδελφόν, αἰτήσασα παρ' Ἀντωνίου, δέκα φασήλους τριηρετικοῖς, ἐπιμύκτοις ἐκ τε φορτίδιων νεῶν καὶ μακρῶν. See note on *μονοπάρωνες* on p. 108 for a further account of these ships.

<sup>61</sup> See note on *actuariæ* on p. 105, and subsequent notes in the Appendix. The 'round' class would include the γαῦλοι and the ἵπποι, the *corbitæ* and the *cynææ*, and perhaps the *κάνθαροι* and the *κύκνοι* and also the *ποντόνες*.

The dimensions of one of the great merchant-ships employed in carrying corn from Egypt to Italy about 150 A.D. have fortunately been put on record. According to Lucian, her length was a hundred and eighty feet, while her breadth was slightly more than a fourth of her length, and her depth was forty-three feet and a half, reckoning from the upper deck to the bottom of the hold; so that, including the keel, her depth must have been about the same as her breadth<sup>63</sup>. The well-known dimensions in the Hebrew version of the legend of the Flood, four hundred and fifty feet of length, seventy-five feet of breadth, and forty-five feet of depth, apparently belong to the ark that has been introduced there under Egyptian influence, and not to the ship that has been implicitly retained there with other features of the Babylonian versions. The earlier Babylonian version in the inscriptions states that the depth of the ship was the same as the breadth, but is illegible in its statement of the measurements<sup>64</sup>. The extant copies of the later Babylonian version recorded by Berosos state that the length of the ship was either five or fifteen stades, and the breadth two stades<sup>65</sup>. In this equality

<sup>63</sup> Lucian, *navigium*, 1, τί γὰρ εἶδει καὶ ποιεῖν, ὦ Λυκῖνε, σχολὴν ἀγοντα, πυθόμενον οὕτως ὑπερμεγέθη ναὺν καὶ πέρα τοῦ μέτρου εἰς τὸν Πειραιᾶ καταπεπλευκέναι μίαν τῶν ἀπ' Αἰγύπτου εἰς Ἱταλίαν σιταγωγῶν; 5, ἀλλὰ μεταξὺ λόγων, ἡλικὴ ναῦς, εἰκοσι καὶ ἑκατὸν πήχεων ἔλεγε τὸ μήκος ὁ ναυπηγός, εὖρος δὲ ὑπὲρ τὸ τέταρτον μάλιστα τούτου, καὶ ἀπὸ τοῦ καταστρώματος εἰς τὸν πυθμένα, ἥ βαθύτατον κατὰ τὸν ἀντλόν, ἑννέα πρὸς τοῖς εἰκοσι.

<sup>64</sup> Rawlinson, *Cuneiform Inscriptions of Western Asia*, vol. iv, pl. 50, col. 1, ll. 25, 26 = pl. 43, col. 1, ll. 27, 28, in the new edition. I am indebted to Dr Budge, of the British Museum, for verifying the statement in the text.

<sup>65</sup> Berosos, Fr. 7, apud Syncellum, p. 30, σκάφος, τὸ μὲν μήκος σταδίων πέντε, τὸ δὲ πλάτος σταδίων δύο, but the length is estimated at fifteen stades instead of five in the corresponding extract from Berosos in the first book of the *Chronica* of Eusebios, as retranslated from the Armenian edition. If these were common stades of a hundred fathoms each, the length of the ship would be either 3000 ft. or 9000 ft., and the breadth 1200 ft.: so the reading must be corrupt.

<sup>66</sup> Genesis, vi. 15, καὶ οὕτω ποιήσεις τὴν κιβωτὸν· τριακοσίων πήχεων τὸ μήκος τῆς κιβωτοῦ, καὶ πεντήκοντα πήχεων τὸ πλάτος, καὶ τριάκοντα πήχεων τὸ ὕψος αὐτῆς. The word seems to have puzzled Philo Judæus, for he speaks vaguely of a wooden structure without a hint about its shape, *vita Moysis*, ii. 11, ξύλινον δημιουργήσας ἔργον μέγιστον εἰς πήχεις τριακοσίων μήκος, κ.τ.λ. cf. 12, πρόεισιν ἐκ τοῦ ξυλίνου κατασκευάσματος. In the Greek version of the legend, with Deucalion as hero, the vessel is termed a box, *λάρναξ*.

of breadth and depth the legendary vessel resembles the merchant-ship just mentioned; and in a possible ratio of breadth to length she resembles the war-ships for which the docks at Zea were constructed: but in none of her proportions does she resemble the ark. The authors of the Septuagint had every means of ascertaining the exact sense of the word *tēbāh*, or *ark*, since it was of Egyptian origin; and they translated it by the word *kibotos*, or *chest*. This was an epithet of Apameia in Phrygia: and upon coins of that city the ark of Noah is represented as a rectangular chest<sup>65</sup>.

The tonnage of ancient ships cannot safely be deduced from their dimensions, as so little is known about their form. But the amount of cargo carried by various merchant-ships is here and there recorded, this amount being generally computed by the talent or the amphora, which each weighed about a fortieth part of a ton<sup>66</sup>. And the largest merchant-ships are always described as carrying ten thousand talents, or 250 tons, though they may really have carried rather more, ten thousand being a round number of the vaguest sort<sup>67</sup>. The tonnage of such ships would be roughly 150, register.

<sup>65</sup> Herodotos, i. 194, ποιεῖται δὲ καὶ κάρτα μεγάλα ταῦτα τὰ πλοῖα καὶ ἐλάσσω· τὰ δὲ μέγιστα αὐτῶν καὶ πεντακισχιλίων ταλάντων γόμον ἔχει, ii. 96, ἔστι δὲ σφι τὰ πλοῖα ταῦτα πλήθει πολλὰ, καὶ ἄγει ἑνια πολλὰς χιλιάδας ταλάντων, the former on the Euphrates and the latter on the Nile. Athenæos, v. 43, κέρκυρος, τρισχίλια τάλαντα δέχεσθαι δυνάμενος. Livy, xxi. 63, citing a law enacted at Rome shortly before 220 B.C., *ne quis senator, cuius senatorius pater fuisset, maritimam navem, quæ plus quam trecentarum amphorarum esset, haberet: id satis habitum ad fructus ex agris vectandos: questus omnis Patribus indecorus visus est*. Cicero, ad familiæres, xii. 15. 2, *naves onerarias, quarum minor nulla erat dum nullum amphorum*. Pliny, vi. 24, *magnitudo (navium) ad terna millia amphorum*. As the talent and the amphora each represented a cubic foot of water, and a Greek or Roman foot measured about .97 of an English foot, the talent and the amphora each weighed very nearly 57 lbs.

<sup>66</sup> Ctesias, Fr. 57. 6, apud Photium, p. 45, τὸ δὲ ὕψος, ὅσον μυριοφόρον νεὺς ἰστέος. Thucydides, vii. 25, προσαγαγόντες γὰρ ναὺν μυριοφόρον, κ.τ.λ. Pollux, iv. 165, μυριοφόρος, ὡς Θουκυδίδης· ὡς δὲ Δελναρχος, μυριαγωγούσα. cf. Philo Judæus, de plantatione Noe, 6, μυριαγωγὰ σκάφη, de incorruptibilitate mundi, 26, μυριοφόροις ναυσίν. Strabo, iii. 3. 1, ὁ δὲ Τάγος καὶ τὸ πλάτος ἔχει τοῦ στήματος εἰκοσὶ πρὸς σταδίων καὶ τὸ βάθος μέγα, ὥστε μυριαγωγαῖς ἀναπλεῖσθαι, xvii. 1. 26, πλάτος δ' ἔχει πηχῶν ἑκατὸν ἢ διῶρυξ, βάθος δ' ὅσον ἀρκεῖν μυριοφόρῳ νηϊ. Heliodoros, Æthiopia, iv. 16, ἔλεγον δὲ οὖν εἶναι Φοίνικες Τύριοι, τέχνην δ' ἐμποροὶ, πλεῖν δ' ἐπὶ Καρχηδόνα τὴν Διβύων, ὁκκάδα μυριοφόρον Ἰνδικῶν τε καὶ Αἰθιοπικῶν καὶ τῶν

Larger ships were built for special purposes. About 40 A.D. the Vatican obelisk and its pedestal were brought from Egypt to Italy in a ship which Pliny describes as the most wonderful vessel that ever was beheld upon the sea; evidently meaning that she was the largest, for he comments on her length and her capacity and the size of her mast, but says nothing about any peculiarity in design. The obelisk and pedestal together weigh between 496 and 497 tons; and about 800 tons of lentils were stowed on board to keep them steady<sup>68</sup>. Therefore, unless there is some error about the quantity of lentils, the ship carried fully 1,300 tons, or more than five times the load of the largest merchant-ships afloat. This ship was

ἐκ Φωϊκῆς ἀγωγίμων φέροντες. Themistios, oratio xvi, p. 212, καὶ νῦν καθέστηκε μὲν ἅπαντα ἥπειρος, γῆ δὲ καὶ θάλαττα τοὺς προστάτας στεφανοῦσιν, ἡ δὲ ἀρχὴ καθάπερ ναὺς μυριοφόρος πολλὰ δὴ πονηθεῖσα ὑπὸ χειμῶνος καὶ τρικυμίας ἀναλαμβάνει καὶ ὀχυροῦται. Himerios, oratio xiv, p. 622, πλεῖ ποτὲ καὶ μυριοφόρος ὀκάς, πολλὴν μὲν χρόνον χερσεύουσα, ὅτι μὴ πέλαγος τοσοῦτον εὕρισκε βαθύτητι, ὥστε καὶ λύσαι τὰ πείσματα. Automedon, in the Anthology, x. 23. 5, ναὺς ἄτε μυριοφόρος. Manasses, 4886, 4887, καὶ ταῦτ' εἰπὼν ἐκέλευσε γνάθοις πυρὸς παμφάγου | τὴν ναὺν τὴν μυριοφόρον αὐτόφορον βρωθήναι.

<sup>68</sup> Pliny, xvi. 76, *abies admirationis præcipuæ visa est in nave, quæ ex Ægypto Gaii principis iussu obeliscum in Vaticano Circo statutum quattuorque trunco lapidis eiusdem ad sustinendum cum adduxit, qua nave nihil admirabilius visum in mari certum est. CXX M modiorum lentis pro saburra ei fuere. longitudo spatium obtinuit magna ex parte Ostiensis portus latere lævo: ibi namque demersa est a Claudio principe cum tribus molibus turrium altitudine in ea exedificatis obiter Puteolano pulvere advectisque. arboris eius crassitudo quattuor hominum ulnas complectentium implebat.* A modius was equivalent to the third part of a cubic foot, so that 120,000 modii would occupy a space of 40,000 cubic feet: and the weight would be nearly 46 lbs. for every cubic foot, as Egyptian lentils weigh about 50 lbs. per cubic English foot, when closely packed. According to Fontana, Della trasportazione dell' obelisco Vaticano, pp. 9, 23, the obelisk itself weighs 963,537 lbs., while the four blocks of the pedestal weigh 165,464 and 67,510 and 179,826 and 110,778 lbs. respectively: and a ton contains about 2,996 lbs. of this measure. Fontana replaced the obelisk upon the original pedestal after its removal from the Circus in 1586.

<sup>69</sup> Pliny, xxxvi. 1, *navesque marmorum causa fiunt, ac per fluctus, sævissimam rerum naturæ partem, huc illuc portantur iuga.*

<sup>70</sup> Pliny, xxxvi. 14, *super omnia accessit difficultas mari Romæ (obeliscos) devehendi, spectatis admodum navibus. divus Augustus priorem advexerat, miraculique gratia Puteolis navalibus perpetuis dicaverat; sed incendio consumpta est. divus Claudius aliquot per annos asservatam, quam Gaius Cæsar importaverat, omnibus quæ unquam in mari visa sunt mirabiliorem, in ipsa turribus Puteolis e pulvere exedificatis, perductam Ostiam portus gratia mersit.*

doubtless of the class that the Romans built expressly for transporting marble<sup>69</sup>. Pliny says plainly that she was larger than the ship which had performed the somewhat easier task of carrying the Flaminian obelisk from Egypt to Italy fifty years before<sup>70</sup>: yet that ship was afterwards reputed to have carried 2,700 tons of corn, a quantity of pepper and linen and paper and glass, and also fourteen hundred men, besides the obelisk and its pedestal<sup>71</sup>. The tale is absurd: and so also is the tale that 2,400 tons of corn, 250 tons of salted fish, 500 tons of wool, and 500 tons of miscellaneous cargo were put on board a ship that Hieron built at Syracuse and afterwards gave to Ptolemy on finding her too large for use<sup>72</sup>. Athenæos

<sup>71</sup> Cedren, p. 172, ἐπὶ δὲ τῆς βασιλείας Αὐγούστου Καίσαρος εἰσῆλθε πλοῖον ἀπὸ 'Αλεξανδρείας εἰς τὴν πόρταν 'Ρώμης, ἐπιφερόμενον σίτου μοδίων χιλιάδας ὕ', ἐπιβάτας 'ασ', ναύτας σ', πέπερι, ὀθόνας, χάρτην, ὑέλια, καὶ τὸν μέγαν ὀβελίσκον μετὰ τοῦ βασιλέως, αὐτὸν τε ἐστῶτα ἐν τῷ μεγάλῳ ἱππικῷ, ἔχοντα ὕψος πύδας πζ' ἡμῖσιν. For τοῦ βασιλέως read τῆς βάσεως. Another version is printed by Mommsen, Ueber den Chronographen vom Jahre 354, at p. 646, *hoc imp. navis Alexandrina primum in portu Romano introivit nomine Acatus, qui attulit frumenti modios CCCC, vectores MCC, piper, linteamen, carta, vitria, et opolisicum cum sua sibi base, qui est in Circo Maximo altum pedes LXXXVIII*. A modius being equivalent to the third part of a cubic foot, 400,000 modii would occupy a space of 133,333 cubic feet: and the weight would be about 45 lbs. for every cubic foot, since corn weighs rather more than 49 lbs. per cubic English foot. According to Fontana, *l. c.*, p. 75, the Flaminian obelisk weighs 702,276 lbs. and its pedestal 497,187 lbs.; or altogether 287,652 lbs. less than the Vatican obelisk and pedestal.

<sup>72</sup> Athenæos, v. 40, περὶ δὲ τῆς ἐπὶ 'Ιέρωνος τοῦ Συρακοσίου κατασκευασθείσης νεώς, ἧς καὶ 'Αρχιμήδης ἦν ὁ γεωμέτρης ἐπόπτης, οὐκ ἄξιον εἶναι κρίνω σιωπῆσαι, σύγγραμμα ἐκδόντος Μοσχίωνος τινός, ᾧ οὐ παρέργως ἐνέτυχον ὑπογυῖως. γράφει οὖν ὁ Μοσχίων οὕτως, κ.τ.λ. 44, σίτου δὲ ἐνεβάλλοντο εἰς τὴν ναὺν μυριάδες ἑξ, ταρίχων δὲ Σικελικῶν κεράμια μύρια, ἐρεῶν τάλαντα δισμύρια, καὶ ἕτερα δὲ φορτία δισμύρια. χωρὶς δὲ τούτων ὁ ἐπισιτισμὸς ἦν τῶν ἐμπλεόντων. ὁ δ' 'Ιέρων, ἐπεὶ πάντας τοὺς λιμένας ἤκουε, τοὺς μὲν ὡς οὐ δύνατοί εἰσι τὴν ναὺν δέχεσθαι, τοὺς δὲ καὶ ἐπικινδύνους ὑπάρχειν, διέγνω δῶρον αὐτῇ ἀποστεῖλαι Πτολεμαίῳ τῷ βασιλεῖ εἰς 'Αλεξάνδρειαν· καὶ γὰρ ἦν σπάνις σίτου κατὰ τὴν Αἴγυπτον. καὶ οὕτως ἐποίησε· καὶ ἡ ναὺς κατήχθη εἰς τὴν 'Αλεξάνδρειαν, ἐνθα καὶ ἐνεωλκῆθη. ὁ δ' 'Ιέρων καὶ 'Αρχιμήλον, τὸν τῶν ἐπιγραμματίων ποιητὴν, γράψαντα εἰς τὴν ναὺν ἐπιγράμμα, χιλίοις πυρῶν μεδίμνοις, οὗς καὶ παρέπεμψεν ἰδίῳς δαπανήμασιν εἰς τὸν Πειραιᾶ, ἐτίμησεν. The corn would all be measured by the medimnos, as was customary: and a medimnos was equivalent to two cubic feet. So the 60,000 measures of corn would occupy a space of 120,000 cubic feet. A κεράμιον was presumably an amphora; and a φορτίον the equivalent of a talent or an amphora, as that meaning is implied in μυριόφορος: see note 67. It is clear that nothing was known of Moschion even then, else Athenæos would not speak of him as Μοσχίωνος τινός.

quotes this tale from Moschion, and Moschion cites an epigram by Archimelos: but nothing whatever is known of Archimelos or of Moschion; and Athenæos did not write until 200 A.D., while Hieron died before 200 B.C. The epigram celebrates a ship that brought some gifts of corn from Hieron to the Greeks, and declares her size by saying that the hull rivalled Etna in its bulk, the mast touched the stars, and so forth<sup>73</sup>: but such language seems hardly more appropriate if the ship carried 3,650 tons, than if she carried a half or a quarter or an eighth of that load; and a ship might fairly be deemed a monster, if she carried even 500 tons at a time when others could not carry more than 250. In his narrative Moschion says that Archimedes succeeded in launching this huge ship by means of some mechanical contrivance of his own invention: yet Plutarch tells substantially the same story about Archimedes without a hint

<sup>73</sup> Athenæos, v. 44, ἔχει δ' οὕτως τὸ ἐπίγραμμα:—*τίς τόδε σέλημα πέλων ἐπὶ χθονὸς εἰσατο; ποῖος | κοίρανος ἀκαμάτοις πεισµασιν ἡγάγετο; | πῶς δὲ κατὰ δρυῶνων ἐπάγη σάνις; ἢ τίνι γόµφοι | τμηθέντες πελέκει τοῦτ' ἔκαμον τὸ κύτος, | ἢ κορυφαῖς Αἰτνας παρισούµενον, ἢ τίνι νάσων, | ἃς Αἰγαῖον ὕδωρ Κυκλάδας ἐνδέδεται, | τοίχοις ἀµφοτέρωθεν ἰσοπλατέ; ἢ ῥα Γίγαντες | τοῦτο πρὸς οὐρανίας ἔξεσαν ἀτραπιτοῦς. | ἄστρων γὰρ ψαυεῖ καρχήσια, καὶ τριελίκτους | θώρακας μεγάλων ἐντὸς ἔχει νεφέων. | πεισµασιν ἀγκύρας ἀπερείδεται, οἷσιν Ἀβύδου | Ξέρξης καὶ Σηστοῦ δισσοῦν ἔδησε πόρον. | µανύει στιβαρὰς κατ' ἐπωµίδος ἀρτιχάρακτον | γράµµα, τίς ἐκ χέρσου τάνδ' ἐκύλισε τρόπον. | φατὶ γὰρ ὡς "Ἰέρων Ἱεροκλέος Ἑλλάδι πάσα | καὶ νάσοις καρπῶν πλοῖα δωροφόρον | Σικελίας σκαποῦχος ὁ Δωρικός." ἀλλὰ, Πόσειδον, | σῶζε κατὰ γλαυκῶν σέλημα τόδε ῥοθίων. A certain Archimedes is the author of the epigram in the Anthology, vii. 50, the manuscript distinctly naming Ἀρχιμήδους, though editors have printed this as Ἀρχιμήλου to match the name in Athenæos. Nothing is known of this Archimelos.*

<sup>74</sup> Athenæos, v. 40, ὡς δὲ περὶ τὸν καθελκυσµὸν αὐτοῦ τὸν εἰς τὴν θάλασσαν πολλὰ ζήτησις ἦν, Ἀρχιμήδης ὁ µηχανικὸς µόνος αὐτὸ κατήγαγε δι' ὀλίγων σωµάτων. κατασκευάσας γὰρ ἑλικά, τὸ τῆλικούτον σκάφος εἰς τὴν θάλασσαν κατήγαγε. πρῶτος δ' Ἀρχιμήδης εὗρε τὴν τῆς ἑλίκας κατασκευὴν. Plutarch, Marcellus, 14, θαυµάσαντος δὲ τοῦ Ἰέρωνος καὶ δεηθέντος εἰς ἔργον ἐξαγαγεῖν τὸ πρόβλημα καὶ δεῖξαι τι τῶν μεγάλων κινούµενον ὑπὸ σµικρᾶς δυνάµεως, ὁκλάδα τριάρµενον τῶν βασιλικῶν πλοίων καὶ χειρὶ πολλῇ νεωκληθεῖσαν, ἐµβαλὼν (Ἀρχιμήδης) ἀνθρώπους τε πολλοὺς καὶ τὸν συνήθη φόρτον, αὐτὸς ἄνωθεν καθήµενος, οὐ μετὰ σπουδῆς ἀλλὰ ἡρέµα τῇ χειρὶ σείων ἀρχὴν τινα πολυσπάστου, προσηγάγετο λείως καὶ ἀπταίστως καὶ ὥσπερ διὰ θαλάττης ἐπιθέουσιν. ἐκπλαγεὶς οὖν ὁ βασιλεὺς, κ.τ.λ. For the meaning of τριάρµενος, see note 124 on p. 54. The term πολυσπάστον denotes a combination of ropes and pulleys, cf. Vitruvius, x. 2-10: and the term ἑλιξ may well denote the same machine, for it conveys the notion of some sort of twisting, and the ropes

that the ship was of abnormal size<sup>74</sup>. And then Moschion dilates upon the luxury of the cabins and the baths and the covered walks on deck, shaded by vines and whole gardens of plants in pots; while Suetonius describes the very same display of luxury on board Caligula's yachts: and Caligula was the emperor who built the great ship for the obelisk<sup>75</sup>. Thus, in all probability, Moschion has blended some of the characteristics of that great ship and those luxurious yachts in a vessel of ideal size and splendour; and then endeavoured to give reality to his idea by associating it with some vessel that Hieron sent to Ptolemy.

Caligula perhaps was rivalled or surpassed in shipbuilding by some of his successors: but there is no proof of this. A great ship was built by Constantine for the Lateran obelisk, which is the largest obelisk of all, and weighs between 441 and 442 tons<sup>76</sup>: but the Vatican obelisk came over with

here twisted round the pulleys. Archimedes' screw was termed *κοχλίας*, and obviously has nothing to do with this *ἑλιξ*. The story is subsequently told by Proclus, in Euclidem, p. 18, *ὅλον δὲ καὶ Ἰέρων ὁ Συρακούσιος εἰπεῖν λέγεται περὶ Ἀρχιμήδους, ὅτε τὴν τριάρμενον κατεσκεύασε ναῦν, ἣν παρεσκευάζετο πέμπειν Πτολεμαίῳ τῷ βασιλεῖ τῷ Αἰγυπτίῳ. πάντων γὰρ ἅμα Συρακουσίῳν ἐλκύσαι τὴν ναῦν οὐ δυναμένων, Ἀρχιμήδης τὸν Ἰέρωνα μόνον αὐτὴν καταγαγεῖν ἐποίησεν. καταπλαγείς δὲ ἐκεῖνος, κ.τ.λ.* And again by Tzetzes, *chiliades*, ii. 103—108, *ὁ Ἀρχιμήδης ὁ σοφός, μηχανητὴς ἐκεῖνος, | τῷ γένει Συρακούσιος ἦν, γέρων γεωμέτρης, | χρόνους τε ἑβδομήκοντα καὶ πέντε παρελαύνων, | ὅστις εἰργάσατο πολλὰς μηχανικὰς δυνάμεις, | καὶ τῇ τρισπᾶσθι μηχανῇ χειρὶ λαίῳ καὶ μόνῃ | πεντεμυριομέδιμνον καθέλκυεν ὀλκάδα.* There is a variant *ἑπταμυριομέδιμνον* for *πεντεμυριομέδιμνον* in the last line.

<sup>75</sup> Suetonius, *Caligula*, 37, and *Athenæos*, v. 41, 42, both quoted in note 133 on pp. 58, 59.

<sup>76</sup> *Ammianus*, xvii. 4. 13, *quo (obelisco) convecto per alveum Nili, proiectoque Alexandria, navis amplitudinis antehac inusitata edificata est, sub trecentis remigibus agitata.* 14, *quibus ita provisus, digressoque vita principe memorato (sc. Constantino), urgens effectus intepuit: tandemque sero impositus navi per maria fluentaque Tybridis, velut paventis ne quod pæne ignotus miserat Nilus, ipse parum sub meatu sui discrimine mœnibus alumnis inferret, defertur in vicum Alexandri, tertio lapide ab urbe seiunctum; unde chamulcis impositus, tractusque lenius, per Ostiensem portam piscinamque publicam Circo illatus est Maximo.* The oars must have been auxiliary—see p. 20—for three hundred rowers would have been of little service in propelling a ship of that size. According to Fontana, *Della trasportatione dell' obelisco Vaticano*, p. 70, the Lateran obelisk weighs 1,322,938 lbs.: and a ton contains about 2,996 lbs. of this measure. The existing pedestal was constructed by Fontana in 1588.



its pedestal, whereas this had none; and Caligula's ship thus took a heavier load than Constantine's. The merchant-ships employed as transports with Justinian's fleet in 533 A.D. must have carried from 120 to 200 tons apiece, and not from 120 to 2,000, as stated in the current reading of Procopios. There were five hundred of them; and if they carried 160 tons upon the average, they carried 80,000 tons altogether, and thus afforded ample transport for an army of only sixteen thousand men: whereas the army would have had far more transport than it needed, if the largest of the ships had carried 2,000 tons apiece<sup>77</sup>.

War-ships were relatively of very little burden; for they were not meant to keep the sea, and consequently had hardly anything to carry except their crew. Thus the Tiber was still navigable as far as Rome for ten-banked war-ships at a time when any merchant-ship carrying more than three thousand talents was compelled to anchor at the mouth<sup>78</sup>. Therefore, unless war-ships were relatively of lighter draught than

<sup>77</sup> Procopios, de bello Vandalico, i. 11, ἤδη δὲ ζὺν αὐτοῖς καὶ τὴν ἐς Καρχηδόνα στρατείαν ἐν παρασκευῇ εἶχε, πεζοὺς μὲν στρατιώτας μυρίους, ἱππέας δὲ πεντακισχιλοὺς ἐκ τε στρατιωτῶν καὶ φοιδεράτων ξυνειλεγμένους...εἶποντο δὲ αὐτοῖς "Ἐρουλοὶ τετρακόσιοι, καὶ ξύμμαχοι βάρβαροι ἑξακόσιοι μάλιστα ἐκ τοῦ Μασσαγετῶν ἔθνους, ἱπποτοξόται πάντες...ναῦς δὲ ἡ ξύμπασα στρατιὰ πεντακοσίας ἦγε, καὶ αὐτῶν οὐδεμία πλέον ἢ κατὰ μυριάδας πέντε μεδίμνων φέρειν οἷα τε ἦν, οὐ μὴν οὐδὲ ἔλασσον ἢ κατὰ τρισχιλοὺς. ναῦται δὲ δισμύριοι ἐπέπλεον ἀπάσαις. A great number of these sailors must have been employed as rowers on the war-ships: see note 45 on p. 17. As the medimnos was primarily a measure for corn, the load was probably about 90 lbs. for every medimnos: for a medimnos was equivalent to two cubic feet, and the weight would be about 45 lbs. for every cubic foot, since corn weighs rather more than 49 lbs. per cubic English foot. The emendation is necessarily *χιλιάδας* for *μυριάδας*.

<sup>78</sup> Dionysios of Halicarnassos, iii. 44, αἱ μὲν οὖν ἐπὶ κωπῶν νῆες ὀηλῆσαι ποτ' ἂν οὔσαι τύχωσι, καὶ τῶν ὀλκάδων αἱ μέχρι τρισχιλιοφόρων, εἰσάγουσί τε διὰ τοῦ στόματος αὐτοῦ καὶ μέχρι τῆς Ῥώμης εἰρεσιὰ καὶ ῥύμασι παρελκόμεναι κομίζονται· αἱ δὲ μείζονες πρὸ τοῦ στόματος ἐπ' ἀγκυρῶν σαλεύουσαι ταῖς ποταμιογχοῖς ἀπογεμίζονται τε καὶ ἀντιφορτίζονται σκάφαις. Dionysios was at Rome from 30 to 8 B.C., working at his history; and ten-banked ships presumably were the largest war-ships then afloat, as they were the largest that fought at Actium in 31 B.C.: see note 54 on p. 21.

<sup>79</sup> Thucydides, iv. 118, citing the treaty of 423 B.C., Λακεδαιμονίους καὶ τοὺς ξυμμάχους πλεῖν μὴ μακρὰ νηί, ἀλλὰ κωπήρεϊ πλοίῳ ἐς πεντακόσια τάλαντα ἀγορτὶ μέτρα.

merchant-ships on account of some difference in design, a war-ship of ten banks did not carry more than three thousand talents, or 75 tons; and that would be the weight of a crew of a thousand men, weighing twelve stone apiece upon the average. At this rate a war-ship of three banks, with a crew of two hundred men, carried only six hundred talents, or 15 tons: and in a treaty concluded at a time when war-ships were normally of three banks, a prohibition against war-ships is backed by a prohibition against any other ships propelled by oars, if they carried more than five hundred talents; apparently, just to preclude the construction of vessels that could be converted into war-ships on emergency<sup>79</sup>.

The hull, as a whole, generally was built of pine on merchant-ships and fir on war-ships; though pine and cypress and cedar were also used for war-ships, the practice varying in different districts according to the nature of the timber that they produced<sup>80</sup>. The timber for the keels was selected with especial care<sup>81</sup>. All the larger merchant-ships had keels

<sup>79</sup> Theophrastos, *historia plantarum*, v. 7. 1, ἐλάτῃ μὲν οὖν καὶ πεύκῃ καὶ κέδρῳ, ὡς ἀπλῶς εἰπεῖν, ναυπηγήσιμα. τὰς μὲν γὰρ τριήρεις καὶ τὰ μακρὰ πλοῖα ἐλάτινα ποιοῦσι διὰ κουφότητα, τὰ δὲ στρογγύλα πεύκωνα διὰ τὸ ἀσαπές· ἔνιοι δὲ καὶ τὰς τριήρεις διὰ τὸ μὴ εὐπορεῖν ἐλάτῃς. οἱ δὲ κατὰ Συρίαν καὶ Φοινίκην ἐκ κέδρου· σπανίζουσι γὰρ καὶ πεύκης. οἱ δ' ἐν Κύπρῳ πίτυος· ταύτην γὰρ ἡ νῆσος ἔχει, καὶ δοκεῖ κρείττων εἶναι τῆς πεύκης. Plutarch, *quæstiones convivales*, v. 3. 1, οὐ μὴν ἀλλὰ κατ' ἰδίαν τῷ Ποσειδῶνι φαίη τις ἂν τὴν πίτυν προσήκειν διὰ τὰς ναυπηγίας μάλιστα. καὶ γὰρ αὕτῃ καὶ τὰ ἀδελφὰ δένδρα, πεύκαι καὶ στρόβιλοι, τῶν τε ξύλων παρέχει τὰ πλοιμώτατα, κ.τ.λ. This στρόβιλος is presumably the *tidulus* which Pliny mentions as a species of the *pinus silvestris* growing in Italy, and used there for shipbuilding, xvi. 17, *liburnicarum ad usus*. Plato, *leges*, p. 705 C, τί δὲ δῆ; ναυπηγήσιμης ὅλης ὁ τόπος ἡμῖν τῆς χώρας πῶς ἔχει;—οὐκ ἔστιν οὕτε τις ἐλάτῃ λόγου ἀξία οὐτ' αὖ πεύκῃ, κυπάριστός τε οὐ πολλή. Vegetius, iv. 34, *ex cypresso igitur et pinu domestica sive silvestri et abiete præcipue liburna contextitur*.

<sup>81</sup> Theophrastos, *historia plantarum*, v. 7. 2, τὴν δὲ τρόπιν τριῆρι μὲν δρυῖν (ποιοῦσι) ἵνα ἀντέχῃ πρὸς τὰς νεωκίας, ταῖς δὲ ὀλκάσι πευκίην—ὀποτιθέασι δ' ἔτι καὶ δρυῖν ἐπ' ἂν νεωκίῳσι—ταῖς δὲ ἐλάττοσιν ὀξύνην· καὶ ὅλως ἐκ τούτου τὸ χέλυσμα. cf. v. 8. 3, ἡ δὲ τῶν Λατίνων ἐφυδρος πᾶσα· καὶ ἡ μὲν πεδεινὴ δάφνην ἔχει καὶ μυρρίνους καὶ ὀξύνην θαυμαστήν, τηλικαῦτα γὰρ τὰ μήκη τέμνουσι ὥστ' εἶναι διηλεκτὰς τῶν Τυρρηνίδων ὑπὸ τὴν τρόπιν· ἡ δὲ ὀρεινὴ πεύκην καὶ ἐλάτν. In the former passage Theophrastos says that the χέλυσμα was usually of beech, and in the latter he speaks of beech-wood ὑπὸ τὴν τρόπιν: so these passages may justify the assertion of Pollux, i. 86, τὸ δ' ὑπὸ τὴν τρόπιν τελευταῖον προσηλούμενον, τοῦ μὴ τριβεσθαι τὴν τρόπιν, χέλυσμα καλεῖται.

of pine, but were provided with false-keels of oak, if they were going to be hauled up ashore or set upon one of those ship-tramways which ran from sea to sea at Corinth and some other places; and the war-ships always had keels of oak, as they used to be hauled up ashore almost every day. Ships of any size generally had false-keels of beech; and the keel itself was made of beech in smaller vessels. Pine

<sup>82</sup> Theophrastos, *historia plantarum*, v. 7. 3, ἡ δὲ τορνεὶα τοῖς μὲν πλοίοις γίνεται συκαμίνου, μέλλας, πετελέας, πλατάνου· γλισχρότητα γὰρ ἔχειν δεῖ καὶ ἰσχύον. χειρόστη δὲ ἡ τῆς πλατάνου· ταχὺ γὰρ σῆπεται. ταῖς δὲ τριήρεσιν ἐνιοὶ καὶ πιτύνας ποιοῦσι διὰ τὸ ἐλαφρόν. τὸ δὲ στερέωμα, πρὸς ᾧ τὸ χέλυσμα καὶ τὰς ἐπωτίδας, μέλλας καὶ συκαμίνου καὶ πετελέας· ἰσχυρὰ γὰρ δεῖ ταῦτ' εἶναι. v. 7. 5, φλύρα δὲ πρὸς τὰ σανιδώματα τῶν μακρῶν πλοίων. See last note for χέλυσμα, and note 141 on p. 62 for ἐπωτίδες. The σανιδώματα must be some sort of planking, and the στερέωμα some sort of backing. The τορνεὶα would be timber cut to shape by carpenters; but possibly ἡ δὲ τορνεὶα should be read ἡ δ' ἐντερώνεια, cf. Aristophanes, *equites*, 1185, εἰς τὰς τριήρεις ἐντερώνεια, Livy xxviii. 45, *interamenta navium*. Plato, *leges*, p. 705 C, πῖτον τ' αἶ καὶ πλατάνον ὀλίγην ἂν εἴροι τις, οἷς δὴ πρὸς τὰ ἐντὸς τῶν πλοίων μέρη ἀναγκαῖον τοῖς ναυπηγοῖς χρῆσθαι ἐκάστοτε. Theophrastos, *historia plantarum*, iv. 2. 8, καὶ ἐν ταῖς ναυπηγίαις χρῶνται πρὸς τὰ ἐγκόλια αὐτῇ, sc. ἀκάνθη. Theophrastos is describing the Egyptian acacia, or mimosa: and Herodotos, ii. 96, remarks that the trading-vessels on the Nile were built entirely of this. For ἐγκόλια see note 95 on p. 39.

<sup>83</sup> *Iliad*, xvi. 482—484, ἤριπε δ', ὡς ὅτε τις δρύς ἤριπεν, ἡ ἀχερωῖς, | ἡὲ πῖτος βλωθρή, τὴν τ' οὐρεσι τέκτονες ἄνδρες | ἐξέταμον πελέκεσσι νεήκεσι, νήιον εἶναι. *Odyssey*, v. 239, 240, κλήθρη τ' αἰγυρός τ', ἐλάτῃ τ' ἦν οὐρανομήκης, | αἶα πάλαι, περίκῃλα, τὰ οἱ πλώϊεν ἐλαφρῶς. Thus, besides pine and fir, there are here two kinds of poplar, ἀχερωῖς and αἰγυρος, and also oak and alder. Alder was so generally employed for shipbuilding in Italy that the Roman poets use *alnus* like *abies* and *pinus* to denote a ship. Virgil, *georgics*, i. 136, *tunc alnos primum fluvii sensere cavatas*, ii. 451, *torrentem undam levis innatat alnus*, cf. *Æneid*, viii. 91, *abies*, x. 206, *pinus*. Lucan, iii. 520, *emeritas repetunt navalibus alnos*. Silius, xii. 522, *transmittunt alno vada*. But they do not use *quercus* in this sense. Valerius Flaccus, v. 66, is referring to the piece of Dodona oak in the bows of the Argo. Theophrastos, *historia plantarum*, v. 4. 3, δοκεῖ γὰρ (δρύς) ὅλως ἀσαπὲς εἶναι· δι' ὃ καὶ εἰς τοὺς ποταμούς καὶ εἰς τὰς λίμνας ἐκ τούτων ναυπηγοῦσιν· ἐν δὲ τῇ θαλάττῃ σῆπεται. But sea-going ships are described by Cæsar, *de bello Gallico*, iii. 13, *naves totæ factæ ex robore ad quamvis vim et contumeliam perferendam*: and Strabo here translates *ex robore* by δρυῖνος ὅλης, iv. 4. 1. These ships, however, were peculiar to the Bay of Biscay. Claudian names beech with alder as a wood for shipbuilding, *de raptu Proserpinæ*, iii. 365, *fagos metitur et alnos*: but the beech, like the oak, probably was wanted for the keel. Theophrastos, *historia plantarum*, iv. 2. 6, ξύλον δὲ (βαλάνου) ἰσχυρόν καὶ εἰς ἄλλα τε χρήσιμον καὶ εἰς τὰς ναυπηγίας. Theophrastos is describing the Egyptian moringa, the tree that produces oil of ben.

and plane, elm and ash, mulberry and lime and acacia, were all employed in the interior of the hull<sup>83</sup>. And alder and poplar and the timber of a balsam-tree are also named among the kinds of wood in use in shipbuilding<sup>83</sup>. But in some outlandish districts the sides of the ships were formed of leather instead of wood<sup>84</sup>. The masts and yards were made of fir, or else of pine; and so also were the oars<sup>85</sup>.

<sup>83</sup> Caesar, *de bello civili*, i. 54, *imperat militibus Cæsar ut naves faciant, cuius generis eum superioribus annis usus Britannia docuerat. carinæ primum ac statumina levi materia fiebant: reliquum corpus navium viminibus contextum coriis tegebatur*. Lucan, iv. 131—135, *primum cana salix madefacto vimine parvum | texitur in puppim, casoque inducta iuvenco | vectoris patiens tumidum superenatat amnem. | sic Venetus stagnante Pado, fusoque Britannus | navigat oceano*. Pliny, vii. 57, *etiam nunc in Britannico oceano (naves) vitiles corio circumscutæ fiunt*. Dion Cassius, xlviii. 18, *δερμάτινα πλοῖα κατὰ τοὺς ἐν τῷ ὠκεανῷ πλέοντας ἐκποιήσαι ἐπεχείρησεν, ἐνδοθεν μὲν ῥάβδοις αὐτὰ κούφαις διαλαμβάνων, ἔξωθεν δὲ βοδὸς δέρμα ὠμὸν ἐς ἀσπίδος κυκλοτεροῦς τρόπον περιτείνων*. cf. 19, *πλοιάρια βύρσινα*. Antiphrilos, in the Anthology, ix. 306, *ὕλοτόμοι παύσασθε νεῶν χάριν. οὐκέτι πύκνη | κύματος, ἀλλ' ἤδη ῥινὸς ἐπιτροχάει*. Strabo speaks of similar vessels on the north coast of Spain, iii. 3. 7, *διφθερίνοις πλοίοις*, and also in the Red Sea, xvi. 4. 19, *δερματίνοις πλοίοις*. Herodotos describes the practice in Assyria, i. 194, *ἐπεὶ γὰρ νομέας ἱτέης ταμύμενοι ποιήσονται, περιτείνουσι τοῦτοισι διφθέρας στεγαστρίδας ἔξωθεν ἐδάφεος τρόπον, οὔτε πρύμνην ἀποκρίνοντες οὔτε πῆρην συνάγοντες, ἀλλ' ἀσπίδος τρόπον κυκλοτερέα ποιήσαντες, κ.τ.λ.* According to Zosimos, iii. 13, five hundred vessels of this sort were built for Julian's campaign there in 363 A.D.

<sup>85</sup> Iliad, vii. 5, 6, *ἐπὶν κεκάμωσιν εὐξέστης ἐλάτῃσιν | πόντον ἐλαύνοντες*. Odyssey, xii. 171, 172, *οἱ δ' ἐπ' ἐρετμὰ | ἐξόμενοι λεύκαυον ὕδωρ ξεστῆς ἐλάτῃσιν*. Theophrastos, *historia plantarum*, v. 1. 6, *ἔστι δὲ καὶ πολύλοπον ἡ ἐλάτῃ καθάπερ καὶ τὸ κρόμμον· αἶψά γὰρ ἔχει τινὰ ὑποκάτω τοῦ φαινομένου καὶ ἐκ τοιούτων ἡ δλη· δι' ἃ καὶ τὰς κόπας ζύοντες ἀφαιρεῖν πειρῶνται καθ' ἓνα καὶ ὁμαλῶς· ἐὰν γὰρ οὕτως ἀφαιρῶσιν, ἰσχυρὸς ὁ κωπέων, ἐὰν δὲ παραλλάξωσι καὶ μὴ κατασπῶσιν ὁμοίως, ἀσθενής· πλῆγῃ γὰρ οὕτως, ἐκείνως δ' ἀφαιρέσεις. ἔστι δὲ καὶ μακρότατον ἡ ἐλάτῃ καὶ ὀρθοφυέστατον· δι' ἃ καὶ τὰς κεφαλὰς καὶ τοὺς ἰστούς ἐκ ταύτης ποιοῦσιν*. Pliny, xvi. 76, *hæ omnium arborum altissima ac rectissima, sc. larix et abies. navium malis antennisque propter levitatem præfertur abies*. See also the passage quoted from Pliny in note 68 on p. 26. Odyssey, xv. 289, 290, *ἰστὸν δ' ἐλάτινον κοίλης ἐντοσθε μεσόδμης | στήσαν ἀέλπντες*. Apuleius, *metamorphoses*, xi. 16, *iam malus insurgit, pinus rotunda*. Lucan, ii. 695, 696, *dum iuga curvantur mali, dumque ardua pinus | erigitur*. iii. 529—531, *validæque triremes, | quasque quater surgens exstructi remigis ordo | commovet, et plures quæ mergunt æquore pinus*. According to Theophrastos, *historia plantarum*, iv. 1. 2, 4, wood from chilly places was reckoned the best for yards and oars, but not for masts. See also Claudian, *de raptu Proserpinæ*, iii. 367—369, *quæ longa est, tumidis præbebit cornua velis: | quæ fortis, malo potior: quæ lenta, favebit | remigio*.

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The timber for ships never was seasoned thoroughly, as it then became too stiff to bend into the needful shapes: but, as a rule, it was allowed some while for drying after it was felled, and then for settling after it was built into a ship; for otherwise the seams were likely to expand considerably and admit the water<sup>86</sup>. The seams were calked by filling them with tow and other packing<sup>87</sup>, and fixing this with wax or tar: and the whole of the outer planking was protected with a coat of tar

<sup>86</sup> Theophrastos, *historia plantarum*, v. 7. 4, τεκτονικῇ μὲν οὖν ἡ παλαιωτάτῃ (ὀλη) κρατίστῃ, ἐὰν ἡ ἄσαπῆς· εὐθετεῖ γὰρ ὡς εἰπεῖν πᾶσι χρῆσθαι. ναυπηγικῇ δὲ διὰ τὴν κάμψιν ἐνικμοτέρᾳ ἀναγκαῖον· ἐπεὶ πρὸς γε τὴν κόλλησιν ἡ ξηροτέρα συμφέρεي. ἴσεται γὰρ καὶ τὰ ναυπηγούμενα καὶ ὅταν συμπαγῇ καθελκυσθέντα συμμῶει καὶ στέγει πλὴν ἐὰν μὴ παντάπασιν ἐξικμασθῇ· τότε δὲ οὐ δέχεται κόλλησιν ἢ οὐχ ὁμοίως. Plutarch, *de fortuna Romanorum*, 9, γενομένην δὲ (ναὺν) στήναι δεῖ καὶ παγῆναι σύμμετρον χρόνον, ἕως οἱ τε δεσμοὶ κάτοχοι γένωνται καὶ συνθήειαν οἱ γόμφοι λάβωσιν· ἐὰν δὲ ὑγροῖς ἔτι καὶ περιολισθαίνουσι τοῖς ἄρμοις κατασπασθῇ, πάντα χαλάσει διατυαχθέντα καὶ δέχεται τὴν θάλατταν. Vegetius, iv. 36, *illud etiam cavendum ne continuo, ut deiectæ fuerint, trabes secentur vel statim, ut sectæ fuerint, mittantur in navem; siquidem et adhuc solida arbores et iam divisæ per tabulas duplices ad maiorem siccitatem mereantur indutias. nam quæ virides compinguntur, cum nativum umorem exudaverint, contrahuntur et rimas faciunt latiores*. Thus, the notion was that the timber ought to be moderately dry, ἐνικμοτέρᾳ, ξηροτέρᾳ, *ad maiorem siccitatem*, but not completely dry, μὴ παντάπασιν ἐξικμασθῇ.

<sup>87</sup> Iliad, ii. 135, καὶ δὴ δοῦρα σέσηπε νεῶν καὶ σπάρτα λέλυνται. This line is noticed by Pliny, xxiv. 40, *nondum enim fuisse Africanum vel Hispanum spartum in usu, certum est: et cum sutiles fierent naves, lino tamen non sparto unquam sutas*. And also by Varro, *apud Aulum Gellium*, xvii. 3, *in Græcia sparti copia modo cepit esse ex Hispania: neque ea ipsa facultate usi Liburni, set hi plerasque naves loris suebant, Græci magis cannabo et stuppa ceterisque sativis rebus, a quibus σπάρτα appellabant*. At Portus near the mouth of the Tiber there was a guild of calkers entitled *splendidissimum corpus stuppatorum*: see Corp. Inscr. Latin. vol. xiv, no. 44. Herodotus, ii. 96, ἔσωθεν δὲ τὰς ἄρμονιας ἐν ὧν ἐπάκτωσαν τῇ βύβλῳ, sc. οἱ Ἀλύπτιοι. Pliny, xvi. 64, *ubi lignosiore cållo (arundo) induruit, sicut in Belgis, contusa et interiecta navium commissuris ferruminat textus, glutino tenacior, rimisque explendis fidelior pice*. Strabo, iv. 4. 1, οὐ συνάγουσι τὰς ἄρμονιας τῶν σανίδων, ἀλλ' ἀραιώματα καταλείπουσι· ταῦτα δὲ βρούοι διανύττουσι. This refers to the ships in the Bay of Biscay.

<sup>88</sup> Genesis, vi. 14, καὶ σφαλτώσεις αὐτὴν (τὴν κιβωτὸν) ἔσωθεν καὶ ἔξωθεν τῇ ἀσφάλτῳ. Hipponax, Fr. 50, *apud Harpocrationem*, s. v. μάλθῃ:—ἐπειτα μάλθῃ τὴν τρώπιν παραχρίσας, cf. Virgil, *Æneid*, iv. 398, *uncta carina*. This μάλθῃ was asphalt: see Pliny, ii. 108, *in Commagene urbe Samosatis stagnum est, emittens limum (maltham vocant) flagrantem*. Pliny, xvi. 21, *pix liquida in Europa e tæda coquitur navalibus muniendis*, 23, *non omitendum, apud eosdem copissam vocari derasam navibus maritimis picem cum cera*. cf. Arrian, *periplus*, 5, καὶ ὁ κηρὸς

or wax or both together<sup>88</sup>. The wax had to be melted over a fire until it was soft enough to be laid on with a brush; and usually some paint was melted with the wax, so that the ship received a coat of colour in encaustic. Pliny states that seven kinds of paint were used in this way, a purple, a violet, a blue, two whites, a yellow and a green; and at a later date there was a paint which matched the colour of the waves<sup>89</sup>. This was selected for vessels employed in reconnoitring or

ἀπεξέσθη. Valerius Flaccus, i. 478—480, *sors tibi, ne qua | parte trahat tacitum puppis mare, fissaque fluctu | vel pice vel molli conducere vulnera cera*. Ovid, metamorphoses, xi. 514, 515, *spoliataque tegmine cera | rima patet, prebetque viam letalibus undis*. Lucian, dialogi mortuorum, 4, καὶ κηρὸν, ὡς ἐπιπλάσαι τοῦ σκαφιδίου τὰ ἀνεψόγδα. Plutarch, quæstiones convivales, v. 3. 1, πίντης τε καὶ ῥητίνης ἀλοιφήν, ἥς ἀνευ τῶν συμπαγόντων ὄφελος οὐδὲν ἐν τῇ θαλάττῃ. Vegetius, iv. 44, *unctasque cera et pice et resina tabulas, sc. navium*. Porphyrogenitos, de cærimoniis, ii. 45, ἐδόθη ὑπὲρ καλαφατήσεως τῶν αὐτῶν ἰά παραβίων· λγ', cf. Zonaras, xvii. 18, τῶν γὰρ τὰς νῆας καταπιττούντων ἦν αὐτῷ ὁ πατήρ, sc. ὁ Καλαφάτης.

<sup>88</sup> Pliny, xxxv. 41, *encausto pingendi duo fuisse antiquitus genera constat, donec classes pingi cœpere: hoc tertium accessit, resolutis igni ceris penicillo utendi, quæ pictura in navibus nec sole nec sale ventisque corrumpitur*. This must mean that the new process was introduced when encaustic was first employed in painting ships—not when ships first were painted, for that was in the earliest times. Pliny, xxxv. 31, *cera tinguntur iisdem his coloribus ad eas picturas quæ inuruntur, alieno parietibus genere sed classibus familiari, iam vero et onerariis navibus*, these colours being *purpurissum*, *indicum*, *cæruleum*, *melinum*, *auripigmentum*, *appianum* and *cerussa*. The *purpurissum* was a shade of purple, and the *cæruleum* was blue; while the *indicum* was some colour between blue and purple, xxxv. 27, *in diluendo mixturam purpuræ cæruleique mirabilem reddit*. The *melinum* is described as *candidum* in xxxv. 19, and classed as *album* in xxxv. 32; so this was white. The *auripigmentum* was presumably a shade of orange. The *appianum* was a shade of green, xxxv. 29, *viride quod appianum vocatur*. The *cerussa* was white-lead, xxxv. 19, *est et colos tertius e candidis, cerussa, cuius rationem in plumbi metallis diximus. fuit et terra per se in Theodoti fundo inventa Smyrnae, qua veteres ad navium picturas utebantur. nunc omnis ex plumbo et aceto fit, ut diximus*. But Vitruvius, vii. 7. 4, says that this *terra* was *creta viridis*, and was known as *theodotium*, while Pliny, xxxv. 29, says that *creta viridis* was used for *appianum*. Vegetius, iv. 37, *ne tamen exploratoriae naves candore prodantur, colore veneto, qui marinis est fluctibus similis, vela tinguntur et funes; cera etiam, qua ungere solent naves, inficitur*. cf. Philostratos, imagines, i. 18, γλαυκοῖς μὲν γέγραπται χρώμασι, sc. ναὺς ληστρική. Corp. Inscr. Attic. vol. ii, no. 807, col. b, ll. 114—118, ὑπαλοφὴ ἐμ φιδανίῳ μέλαινα· ἑτέρα ἐν ἀμφορεῖ μέλαινα· ἑτέρα λευκὴ ἐμ φιδανίῳ· ἐν ἀμφορεῖσι δούιν λευκὴ. These paints were for the ships: see no. 803, col. e, l. 156, col. f, l. 4. Polyænos, v. 34, Νίκων Σάμιος κυβερνήτης, πλησίον τριήρων πολεμίων ὀρμουσῶν, βουλόμενος παραπλεύσας λαβεῖν, τὴν ἀλοιφήν τῆς αὐτοῦ πρὸς ὁμοίαν καταχρίσας ταῖς πολεμαῖς τρήρεσι, ἐπλεῖ κ.τ.λ.

piracy, to keep them out of sight. But the encaustic was often put to a better use than merely giving the ship a coat of colour; and elaborate designs were painted all along the sides, with great groups of figures at the ends, especially at the stern<sup>90</sup>. Such groups may be seen on the sterns of the Greek ships of about 200 B.C. in fig. 24 and the Roman ship of about 200 A.D. in fig. 29. The earliest Greek ships had only patches of colour on the bows, blue or purple or ver-

<sup>90</sup> Athenæos, v. 37, ζῶα μὲν γὰρ εἶχεν (ἡ ναὺς) οὐκ ἐλάττω δώδεκα πηχῶν κατὰ πρῶμῶν τε καὶ πρῶραν, καὶ πᾶς τόπος αὐτῆς κηρογραφία κατεπεποίκιλτο, τὸ δ' ἔγκωπον ἅπαν μέχρι τῆς τρόπῳς κισίνην φυλλάδα καὶ θύρσους εἶχε περίξ. 42, ἡ δὲ ναὺς πᾶσα οἰκείῃς γραφαῖς ἐπεπύνητο, where *oikeia* denotes encaustic, the *genus classibus familiare* of Pliny, xxxv. 31: see last note. Valerius Flaccus, i. 127 ff, *constitit ut longo moles non pervia ponto | puppis, et ut tenuis subire latentia ceræ | lumina, picturæ varios superaddit honores.* | *hic...*, 140, *parte alia.....*, describing in detail two large groups. On one side, Thetis is riding on a dolphin towards the home of Peleus. Three of the Nereids are following her; and Galatea, the last of these, is beckoned back to Sicily by Polyphemos. In front of Thetis is the home of Peleus, where she is seen again at a banquet of the sea-gods. The centaur Cheiron is playing to them on the lyre. On the other side, the centaurs have broken loose at the marriage-feast of Hippodameia. Peleus and his comrades keep them off with sword and spear. The monsters wield fire-brands and use their hoofs; but one is still in his cups and another is galloping away. Horace, odes, i. 14. 14, 15, *nil pictis timidus navita puppibus | fidit.* Ovid, fasti, iv. 275, 276, *picta coloribus ustis | cælestum matrem concava puppis habet,* heroides, 16. 112—114, *accipit et pictos puppis adunca deos. | qua tamen ipse vehor, comitata Cupidine parvo | sponsor coniugii stat dea picta sui,* tristia, i. 4. 7, 8, *monte nec inferior proræ puppique recurvæ | insilit, et pictos verberat unda deos.* Persius, vi. 30, *ingentes de puppe dei.* Propertius, iv. 6. 49, *vehunt proræ Centauros saxa minantes.* Lucian, navigium, 5, τὴν ἐπώνυμον τῆς νεὺς θεὸν ἔχουσα τὴν Ἰσὺν ἐκατέρωθεν, sc. ἡ πρῶρα. These last passages, however, may perhaps refer to carvings: see note 148 on p. 65. On the other hand, several of the passages quoted in that note probably refer to paintings. Aristophanes, ranæ, 932, Διώνυσος:—τὸν ξουθὸν ἰππαλεκτρύνα ζητῶν, τίς ἐστὶν ὄρνις. 933, Αἰσχύλος:—σημείον ἐν ταῖς ναυσὶν, ὡμαθέστατ', ἐνεγέγραπτο. The allusion is to the verses quoted from Æschylus by the scholiast, in pacem, 1177, ἀπὸ δ' αὐτῆς ξουθὸς ἰππαλεκτρῶν | στάζει κηρόθεν τῶν φαρμάκων πολὺς πόνος. The reading is corrupt: but κηρόθεν suggests a word akin to κηρός, and the sense is obviously that the picture melted off in drops while the vessel was burning. That seems to be the earliest record of encaustic on a ship. Hipponax, Fr. 49, apud Tzetzen, in Lycophronem, 424, μμνη κακομήχανε, μηκέτι γράψης | ὅφιν τριήρεος ἐν πολυζύγῳ τοίχῳ | ἀπ' ἐμβόλου φεύγοντα πρὸς κυβερνήτην. The point of this appears to be that the painter meant to put a horizontal band of colour round the ship, but drew it so unsteadily that it twisted about like a snake. According to Pliny, xxxv. 36, there was a tale that Protogenes was once a painter of ships; but the phrase *naves pinxisse* is ambiguous,

milion, the rest of the hull being black with tar; and possibly the painting on the bows was not in wax<sup>91</sup>. Occasionally, the coats of wax or tar were replaced by a sheathing of lead outside the outer planking, some layers of tarred sail-cloth being interposed between the metal and the wood<sup>92</sup>.

The timbers of a ship were held together by wooden pegs and metal nails; and bronze was preferred to iron for the nails, as it was better able to resist the action of the water<sup>93</sup>. When

and may refer to pictures on ships or pictures of ships. It was said that he introduced ships in the background in two of his masterpieces, *ut appareret a quibus initiis ad arcem ostentationis opera sua pervenissent*: and this suggests that he had begun life as a painter of rough pictures of ships. Such pictures were presumably in great demand at a large sea-port like Rhodes, where Protogenes resided, for it was then the custom to dedicate pictures as thank-offerings for escape from storm and shipwreck: see Cicero, *de natura deorum*, iii. 37.

<sup>91</sup> Herodotos, iii. 58, τὸ δὲ παλαιὸν ἀπασαι αἱ νέες ἔσαν μιληλιφέες. The epithet *μιλησιπάρης* occurs once in the *Iliad*, ii. 637, that is to say, in the Catalogue, and once in the *Odyssey*, ix. 125; and the epithet *φονικοπάρης* occurs twice in the *Odyssey*, xi. 124, xxiii. 271: but *μέλαινα* and *κνανόπρωρος* are the normal epithets in both the poems, so that τὸ παλαιὸν cannot include the earliest times. The colour must have been confined to patches on the bows, for in the *Odyssey*, xiv. 308, 311, a ship is first described as *μέλαινα* and then as *κνανόπρωρος*, and the *παρήα* would not be far from the *ὀφθαλμοί* and *σίμωμα*, as to which see note 147 on p. 65 and note 153 on p. 69.

<sup>92</sup> Athenæos, v. 40, τὸ μὲν οὖν ἡμῶν τοῦ παντὸς τῆς νεῶς ἐν μῆσιν ἐξ εἰργάσατο, καὶ ταῖς ἐκ μολίβου ποιηθείσαις κεραμίσις αἰε καθ' ὃ ναπηγηθεῖ μέρος περιελαμβάνετο.....ὥς δὲ καὶ τὰ λοιπὰ μέρη τῆς νεῶς ἐν ἄλλοις ἐξ ἡμῶν κατεσκευάσθη, καὶ τοῖς χαλκοῖς ἡλοῖς πᾶσα περιελήφθη, ὥν οἱ πολλοὶ δεκάμνοοι ἦσαν, οἱ δ' ἄλλοι τούτων ἡμιόλιοι· διὰ τρυπάνων δ' ἦσαν οὗτοι ἡρμοσμένοι, τοὺς σταμίνας συνέχοντες· μολυβδίναις δὲ κεραμίσις ἀπεστεγανούντο πρὸς τὸ ξύλον, ὑποτιθεμένων ὀθονίων μετὰ πίττης. Although Athenæos asserts here that sheathing was used on a ship belonging to Hieron, he may really be describing a practice of Caligula's time or afterwards: see pp. 27—29. L. B. Alberti, *de re ædificatoria*, v. 12, *ex navi Traiani per hos dies dum quo scripsimus commentarer ex lacu Nemorensi eruta (quo loci annos plus MCCC demersa et destituta iacuerat) adverti pinum materiam et cupressum egregie durasse: in ea tabulis extrinsecus duplicem superextensam et pice atra perfusam telam ex lino adglutinantur supraque id chartam plumbeam claviculis eneis coadfirmant*. This was written in 1485 A.D.

<sup>93</sup> *Odyssey*, v. 248, γόμφουσιν δ' ἄρα τὴν γε καὶ ἀρμονήσιν ἀρασσεν. 361, ὄφρ' ἂν μὲν κεν δοῦρατ' ἐν ἀρμονήσιν ἀρήρη. Apollonios Rhodios, i. 369, 370, ἔν' εὐ ἀραροῖατο γόμφοις | δοῦρατα. ii. 79—81, ὥς δ' ὅτε νῆα δοῦρα θεοῖς ἀντίξοα γόμφοις | ἀνέρες ὕληουργοί, ἐπιβλήθην ἐλάοντες, | θείωσι σφύρσιν. Plutarch, *de fortuna Romanorum*, 9, ὥσπερ γὰρ ὀλκὰς ἡ τρέφης ναπηγεῖται μὲν ὑπὸ πληγῶν καὶ βίας πολλῆς, σφύραις καὶ ἥλοις ἀρασσομένη καὶ γομφώμασι καὶ πρῶσι καὶ πελέκεσι, γενομένην δὲ στήναι δεῖ καὶ παγῆναι σύμμετρον χρόνον, ἕως ὅτε τε δεσμοὶ κάτοχοι



necessary, these fastenings were arranged in such a way that the ship could easily be divided into sections for transport overland; and war-ships of three and four and five banks were thus conveyed to distant waters, presumably in thirty or forty sections apiece, since those of thirty oars used to be divided into three<sup>94</sup>.

γένονται καὶ συνήθειαν οἱ γόμφοι λάβωσιν. cf. Æschylos, supplices, 846, γομφοδέτω δόρει. Thus, while the δεσμοί are coupled with the γόμφοι by Plutarch, the ἀρμονίαι are coupled with the γόμφοι in the Odyssey, so the ἀρμονίαι and the δεσμοί may be the same things under different names: cf. Odyssey, v. 33, σχεδὴς πολυδέσμων. And as the γόμφοι certainly were pegs, the δεσμοί or ἀρμονίαι would naturally be the sockets for those pegs. Apparently γομφώμασι is equivalent to γόμφοις in the passage just quoted from Plutarch, and ἀρμοσμάτων to ἀρμονίων in Euripides, Helena, 411, τρέψις δ' ἐλείφθη ποικίλων ἀρμοσμάτων. In that passage Plutarch mentions ἤλοι as well as γόμφοι, and these were usually of metal: see Athenæos, v. 40, quoted in the last note, χαλκοὶ ἤλοι. Cæsar, de bello Gallico, iii. 13, *transtra pedaliibus in latitudinem trabibus confixa clavis ferreis digiti pollicis crassitudine*. Vegetius, iv. 34, *utilius (liburna) æreis clavis quam ferreis confingenda; quamlibet enim gravior aliquanto videatur expensa; tamen, quia amplius durat, lucrum probatur afferre: nam ferreos clavos tepore et umore celeriter robigo consumit, ærei autem etiam in fluctibus propriam substantiam servant*. See also Procopios, de bello Gothico, iv. 22, quoted in note 97 on p. 40, and Tacitus, historię, iii. 47, quoted in the note on *camarie* on p. 107.

<sup>94</sup> Arrian, anabasis, v. 8, ταῦτα ὡς ἔγνω Ἀλέξανδρος, Κοῖνον μὲν τὸν Πολεμοκράτους πέμψας ὀπίσω ἐπὶ τὸν Ἰνδὸν ποταμὸν, τὰ πλοῖα δὲ παρεσκευάσας αὐτῷ ἐπὶ τοῦ πόρου τοῦ Ἰνδοῦ ξυττεμένοντα κελεύει φέρειν ὡς ἐπὶ τὸν Ἰθάσκη ποταμὸν. καὶ ξυτεμῆθη τε τὰ πλοῖα καὶ ἐκομίσθη αὐτῷ, δὲ μὲν βραχύτερα διχῇ διατεμθέντα, αἱ τριακόντεροι δὲ τριχῇ ἐτμήθησαν, καὶ τὰ τμήματα ἐπὶ ξευγῶν διεκομίσθη ἔστε ἐπὶ τὴν δαχην τοῦ Ἰθάσκου· κακεῖ ξυμπηχθὲν τὸ ναυτικὸν αὐθις δὴ ὁμοῦ ὤφθη ἐν τῷ Ἰθάσκη. According to Arrian, anabasis, vii. 19, already quoted in note 13 on p. 6, ships of three and four and five banks were afterwards brought over from the Mediterranean to the Euphrates for Alexander's fleet. See also Strabo, xvi. i. 11, and Quintus Curtius, x. i. 19, already quoted in that same note. The vessels on the Indus are mentioned by Curtius, viii. 10. 2, *iussitque ad flumen Indum procedere et navigia facere, quis in ulteriora transportari posset exercitus. illi, quia plura flumina superanda erant, sic iunxere naves ut solutæ plaustris vehi possent vrsusque coniungi*. All these devices are attributed to Semiramis by Diodoros, ii. 16, μεταπέμψαςτο δὲ καὶ ναυπηγὸς ἐκ τε Φοινίκης καὶ Συρίας καὶ Κύπρου καὶ τῆς ἄλλης τῆς παραβαλάντου χώρας, οἱς ἄφθονον ὕλην μεταγαγούσα διεκελεύσας κατασκευάζειν ποτάμια πλοῖα διαιρετά. 17, ναὺς δὲ ποταμίας κατασκεύασε διαιρετὰς δισχιλίαις, αἱ παρεσκευάσαςτο καμήλους τὰς περὶ παρακομίζουσας τὰ σκάφη. Diodoros is quoting from Ctesias, and Ctesias lived before the time of Alexander; so these devices were customary in those regions. It is said that Nero tried to drown Agrippina by putting her on board a vessel that was to come to pieces on the voyage: Suetonius, Nero, 34, *solutilem navem*. But the project miscarried: Tacitus, annales, xiv. 5, *nec dissolutio navis sequebatur*.

The outer framework of the hull consisted of a keel and ribs<sup>95</sup>. There was not any stern-post; nor was there a stem-post, unless the ship was built to carry a ram. And thus in war-ships and merchant-ships alike the after part of the keel curved slowly upwards till it reached the level of the deck; while in the merchant-ships the fore part made a similar curve

<sup>95</sup> Ovid, *heroides*, 16. 109, 110, *fundatura citas flectuntur robora naves, | texitur et costis panda carina suis*. Procopios, *de bello Gothico*, iv. 22, ἡ τε γὰρ τρόπις μονοφύης οὕσα ἐκ πρόμνης ἄκρας ἄχρι ἐς τὴν πρῶταν διήκει, κατὰ βραχὺ μὲν θαυμασίως ἐπὶ τὸ κοῖλον ὑποχωροῦσα, καὶ αὐτὴ πάλιν ἐνθένδε κατὰ λόγον εὖ μάλα ἐπὶ τὸ ὀρθὸν τε καὶ διατεταμένον ἐπανιοῦσα. τὰ τε παχέα ξύμπαντα ξύλα ἐς τὴν τρόπιν ἐναρμοσθέντα—ἅπερ οἱ μὲν ποιηταὶ δρυόχους καλοῦσιν, ἕτεροι δὲ νομέας—ἐκ τοίχου μὲν ἕκαστον θατέρου ἄχρι ἐς τῆς νεῶς διήκει τὸν ἕτερον τοίχον. This ship was preserved at Rome as a relic of Æneas: see note 55 on p. 21. The term δρυόχοι occurs in the *Odyssey*, xix. 574, where the axes are set up in a long row like the ribs of a ship, δρυόχους ὥς. Also in Polybios, i. 38, αἰδοῖς ἐγνώσαν ἐκ τῶν δρυόχων εἰκοσι καὶ διακόσια ναυπηγεῖσθαι σκάφη, in Plato, *Timæos*, p. 81 B, ὅσον ἐκ δρυόχων, and in similar passages; the notion being that a ship was altogether new, if the ribs were new, as they formed the best part of the framework. The term νομέας is employed by Herodotos, ii. 96, περὶ γόμφους πυκνοὺς καὶ μακροὺς περιέρουσι τὰ διπλήχεα ξύλα· ἐπεὶ δὲ τῷ τρόπῳ τούτῳ ναυπηγῆσονται, ζυγὰ ἐπιπολῆς τελευτοῦσι αὐτῶν· νομεῖσι δὲ οὐδὲν χρεόνται. This seems to mean that the ribs (νομέας) were replaced by trenails (γόμφοι) in these trading-vessels on the Nile, i.e. the timbers of the side were not nailed to vertical supports behind them, but were held together by vertical supports which ran right through them. The term νομέας is again applied to the ribs in the passage quoted from Herodotos in note 84 on p. 33; and in the passage quoted from Cæsar in that note the ribs are termed *statumina*, which answers to *σταμίνας* in Greek. *Odyssey*, v. 252, 253, ἱκρία δὲ στήσας, ἀραρῶν θαμέσι σταμίνεσσι, | ποιεῖ· ἀτὰρ μακρῆσιν ἐπηγκενίδεσσι τελεύτα. These σταμίνες must be the ribs, which stand behind the timbers of the side, ἐπηγκενίδες, and support the upper decking, ἱκρία. And in the passage quoted in note 92 on p. 37 Athenæos says incidentally that the skin and sheathing of the ship were nailed to the σταμίνας. Athenæos classes the σταμίνας with ἐγκοιλία and γόμφοι—cf. v. 40, γόμφοι τε καὶ ἐγκοιλία καὶ σταμίνας—and these γόμφοι may be the trenails which Herodotos describes as substitutes for ribs. In translating from Theophrastos, *historia plantarum*, iv. 2. 8, Pliny renders ἐγκοιλία by *costæ*, xiii. 19. And the *costæ* were the ribs, this metaphor surviving from those times: but the ἐγκοιλία were metaphorically the guts—ἐντερόνεια, *interamenta*, see note 82 on p. 32. They are mentioned again by Strabo, xv. 1. 15, κατεσκευασμένους δὲ (καὺς) ἀμφοτέρωθεν ἐγκοιλίοις μητρῶν χωρὶς. In the mediæval galleys every pair of ribs was in three sections, the *matere* in the middle and the *stamenali* at each end; and these terms must be survivals of *μήτραι* and *σταμίνας*. So, if a vessel had σταμίνας or ἐγκοιλία without μήτραι, each pair of ribs made an acute angle at the keel. Leo, *tactica*, xix. 5, ἐχέτω δὲ καὶ ἐκ περισσοῦ ξύλα τινὰ ἐγκοιλία καὶ σανίδας καὶ στνππία καὶ τίσσαν καὶ ὑγρόπισσον. These things apparently were meant for stopping up holes in the ship's side, the ἐγκοιλία being a makeshift for ribs to put behind the planks.

towards the bows<sup>96</sup>. The skin of the ships was formed of planking laid upon the ribs, and fastened through them to the beams<sup>97</sup>. This planking was seldom of any great thickness: sometimes three inches, sometimes only two and a quarter, and rarely more than five and a quarter<sup>98</sup>. But outside the planking there usually were several waling-pieces, that is to say, long strips of timber running horizontally round the ship in the manner shewn in fgs. 20 to 23, 26 and 29, and known accordingly as *zosteres*, or belts<sup>99</sup>.

<sup>96</sup> The contour of the earliest Greek ships is indicated by the epithets in the *Iliad*, xviii. 3, νεῶν ὀρθοκραυράων, 338, νηυσὶ κορωνίσιν, 573, βοῶν ὀρθοκραυράων, cf. Theocritus, xxv. 151, βοῦσι κορωνίσιν. And if the ships curved upwards at the ends like a bull's horns, the *στεῖρη* was simply the fore part of the keel, not a separate stem-post. *Iliad*, i. 481, 482, ἀμφὶ δὲ κύμα | στεῖρη πορφύρεον μεγάλ' ἱαχε νηὸς ἰούσης. Apollonios Rhodios, i. 525—527, Πηλιάς ἱαχεν Ἀργῶ.....ἐν γὰρ οἱ δόρυ θεῖον ἐλήλατο, τό ρ' ἀνὰ μέσσην | στείραν Ἀθηναίη Δωδωνίδος ἥρμοσε φηγοῦ. Thus when Lucian says ἡ τῆς Ἀργούς τρόπις ἐλάλησεν, *somnium*, 2, and speaks of τὴν Ἀργῶ, τὴν λάλον αὐτῆς τρόπιν, *de saltatione*, 52, he implies that the keel curved upwards till it ended in the figure-head. Lucian, *navigium*, 5, ὥς δὲ ἡ πρύμνα μὲν ἐπανέστηκεν ἡρέμα καμπύλην χρυσοῦν χηνίσκον ἐπικειμένην, καταντικρὺ δὲ ἀνάλογον ἡ πῶρα ὑπερβέβηκεν ἐς τὸ πρόσω ἀπομηκνυομένη. That refers to a merchant-ship of about 150 A.D.: and the contour seems there to be the same as in the earliest Greek ships. Hence that curvature of the keels which is noted by Ovid and Procopius in the passages quoted at the beginning of the last note.

<sup>97</sup> Bianor, in the *Anthology*, xi. 248, ἦδη γάρ μιν ἄπασαν ἐπὶ ζυγὰ γομφωθείσαν | ἡλειφον πέυκης τῇ λεπαρῇ νοτίδι. It was clearly the skin that was bolted to the beams, as it was the skin that received the coat of tar. Procopius, *de bello Gothico*, iv. 22, σανὺς τε πρὸς ἐπὶ τούτοις ἐκάστη ἐκ πρύμνης ἄκρας ἐς τῆς νηὸς ἐξικνεῖται τὴν ἐτέραν ἀρχήν, μνηοειδὴς οὖσα καὶ κέντρα σιδηρὰ τοῦτου ἕνεκα προσλαβοῦσα μόνον, ὅπως δὴ ταῖς δοκοῖς ἐναρμοσθεῖσα τὸν τοῖχον ποιεῖ. These δοκοί are presumably the beams, though possibly they are the *παχέα ξύλα* which Procopius has just defined—see note 95—as δρύοχοι, or ribs: cf. *Athenæos*, v. 44, πῶς δὲ κατὰ δρυῶν ἐπάγη σανὺς; *Cæsar*, *de bello Gallico*, iii. 13, *transtra pedalisibus in latitudinem trabibus confixa clavis ferreis*. These *trabes* appear to be the timbers of the side.

<sup>98</sup> Diogenes Laertius, i. 103, μαθὼν (Ἀνάχαρσις) τέτταρας δακτύλους εἶναι τὸ πᾶχος τῆς νεώς, τοσοῦτον ἔφη τοῦ θανάτου τοὺς πλείοντας ἀπέχειν. cf. *Juvenal*, xii. 58, 59, *digitis a morte remotus | quattuor, aut septem, si sit latissima tæda*. Dion Chrysostom, *oratio* 64, p. 594, οὐδὲ γὰρ πίττη τὴν ψυχὴν οὔτε σχοινίους ἐπιτρέπουσαν, οὔτε τριδάκτυλον αὐτοῖς σώζει ξύλον πεύκινον.

<sup>99</sup> *Heliodoros*, *Æthiopica*, i. 1, ὁλκὰς ἀπὸ πρυμνησίων ὥρμει, τῶν μὲν ἐμπλεόντων χηρεύουσα, φόρτου δὲ πλῆθους· καὶ τοῦτο γὰρ ἦν συμβαλεῖν καὶ τοῖς πῶρῳθεν· τὸ γὰρ ἀχθος ἀχρι καὶ ἐπὶ τρίτῳ ζωστήρῳ τῆς νεώς τὸ ὕδωρ ἀνέθλιβεν. These ζωστήρες can only be the waling-pieces which figure so prominently on the merchant-ships of that period in plate 6. There does not appear to be any earlier instance of this use of the term. Later instances are plentiful. *Manasses*, 4876,

On the war-ships the hull was strengthened externally by a set of cables. These were known as *hypozomata*, or girdles, and used to be fastened round the ship horizontally; the two ends of each cable being joined together, so as to make it a complete girdle extending from stem to stern along the starboard side and back from stern to stem along the port side<sup>100</sup>. On the Egyptian ships of about 1250 B.C., as in figs. 4 and 5, similar cables were stretched from stem to stern over posts amidship<sup>101</sup>: but these clearly were intended to

4877, ἐπὶ γὰρ τρίτον τῆς νηὸς τῆς φορητοῦ ζωστήρα | τὴν θάλασσαν ἀνέθλιβε τῶν ἀγωγίων βάρος, where Zonaras says, xv. 25, φορτὶς βάρει τῶν ἀγωγίων πεφορτισμένη, καὶ τοῦτω μέχρις ἐσχάτου ζωστήρος καταβεβαπτισμένη. Theodoros Prodromos, Rhodanthe et Dosicles, v. 444, 445, ἐκ δευτέρου ζωστήρος ἄχρι καὶ τρίτου | πῖλοις κατεσκέπαστο ναοῖς παχέσι. Unlike the others, these were war-ships, cf. 439, 462: and the padding was meant to turn off missiles. Anna Comnena, vi. 5, αὐταὶ δὲ (αἱ νῆες) τῇ κουφότῃ ἐπεπόλαζον οἷον τοῖς ὕδασι ἀνεχόμεναι, ὥς μὴ ἄχρι δευτέρου ζωστήρος τοῦ ὕδατος φθάνοντος. The waling-pieces had perhaps been known as σέλματα in earlier times. Euripides, Cyclops, 503—506, πλέως μὲν οἴνου, | γάνυμαι δὲ δαιτὸς ἥβη, | σκάφος, ὀλκὰς ὤς, γεμισθεὶς | ποτὶ σέλμα γαστροῦ ἄκρας.

<sup>100</sup> Athenæos, v. 37, τὴν τεσσαρακοντῆρη ναὺν κατεσκεύασεν ὁ Φιλοπάτωρ, τὸ μήκος ἔχουσαν διακοσίων ὀγδοήκοντα πηχῶν, ὅκτω δὲ καὶ τριάκοντα ἀπὸ παρόδου ἐπὶ πάροδον, ὅσος δὲ κ.τ.λ. . . . . ὑποξώματα δὲ ἐλάμβανε δώδεκα· ἐξακοσίων δ' ἦν ἕκαστον πηχῶν. Each of these cables being 600 cubits in length, while the ship was 280 in length and 38 in breadth, each one would just be long enough to pass once round the ship from stem to stern. These measurements may all be fictitious, for Athenæos is quoting from Callixenos: but Callixenos presumably took the trouble to see that his measurements were consistent with each other, so the statement is admissible as evidence that the girding-cables would have been of this length on a ship of these dimensions. Some similar cables on a battering-ram are mentioned by the other Athenæos, *mechanica*, p. 6, ὑποξώννυνται δὲ ὅλος ὁ κριδὸς ὅπλοισι ὀκταδακτύλοις τρισὶ, καὶ διαλαμβάνεται κατὰ μέσον ἐκ τριῶν διαλειμμάτων ἀλύσεισι πηχυαῖσι: and these statements are repeated by Vitruvius, x. 15. 6, *a capite autem ad imam calcem tigni contenti fuerunt funes IIII crassitudine digitorum VIII, ita religati quemadmodum navis a puppi ad proram continetur; eiusque præinictura funes transversis erant ligati, habentes inter se palmipedalia spatia*. This shews that the girding-cables went from the stem of a ship to the stern. Plato, *civitas*, p. 616 c, οἷον τὰ ὑποξώματα τῶν τριήρων, οὕτω πᾶσαν συνέχον τὴν περιφορὰν. This shews that these cables went right round a ship externally. Throughout the inventories of the Athenian dockyards the ὑποξώματα are named among the σκευὴ κρεμαστά, which are distinguished from the σκευὴ ξύλινα—see, for example, the passages cited in note 103—and this excludes the notion that they were made of wood.

<sup>101</sup> The ends of these cables seem to be coiled round the stem and the stern: but those coils may belong to smaller cables for strengthening these parts, as similar coils are represented at the stern of one of the Greek war-ships of about 200 B.C. in the so-called Telephos frieze from Pergamos.

prevent the ship from hogging, and would have been superfluous on Greek or Roman war-ships, which had decking enough to hold the stem and stern together. The girding-cables proved of service to the war-ships in keeping the timbers firm when the ship was labouring in a seaway, or forcing them back into position afterwards if any of them had been started<sup>102</sup>: yet these cables must primarily have been intended to prevent the ship from going to pieces under the heavy shocks from ramming and the constant strain from the working of so many oars, for otherwise they would have been employed on merchant-ships also. In the Athenian navy a set of girding-cables was provided for every ship of three or four banks, though possibly the set did not consist of more than two<sup>103</sup>; and occasionally this provision was increased. Thus in 324 B.C., when a squadron was leaving for the Adriatic, every ship of three or four banks was supplied

<sup>102</sup> Apollonios Rhodios, i. 367—370, νῆα δ' ἐπικρατέως Ἀργοῦ ὑποθημοσύνησιν | ἐξωσαν πάμπρωτον ἐνστρεφεῖ ἐνδοθεν δ' πλῶ | τεινόμενοι ἐκάτερθεν, ὧ' εὖ ἀραροῖατο γόμφους | δούρατα, καὶ βοθλοῖο βίην ἔχου ἀντιώσαν. cf. Horace, odes, i. 14. 6—9, *ac sine funibus | vix durare carinae | possint imperiosius | æquor*. Appian, de bellis civilibus, v. 91, ὁ δὲ (Πομπῆιος) οὐτε περὶ τῆς γῆς ἐνερόησεν, οὐτε τοῖς λευφάνοις τοῦ ναυαγίου παροῖσιν ἢ ἀπιοῦσι, καταστάντος τοῦ κλύδωνος, ἐπεχείρησεν· ἀλλ' ὑπερείδεν ἐκ τῶν δυνατῶν διαζωννύμενους τὰ σκάφη, καὶ ἀνέμῳ διαπλέοντας ἐς τὸ Ἰππώνειον. The *διὰ* in *διαζωννύμενους* is perhaps a corruption of *ὑπό* resulting from a repetition of the *διὰ* in *διαπλέοντας*. Acts, xxvii. 17, *βοηθείαις ἐχρῶντο, ὑποζωννύντες τὸ πλοῖον*. This obscure statement seems to mean that they used expedients which answered the purpose of the girding-cables. They would not find any of these cables on board, for they were on a merchant-ship, and these were used for war-ships: nor could they fix them on a ship during a storm at sea, for even in a dockyard this was a long and troublesome process. cf. Polybios, xxvii. 3, καὶ τεσσαράκοντα ναῦς συμβουλευσας τοῖς Ῥοδίοις ὑποζωννύειν, ἵνα, εἴαν τις ἐκ τῶν καιρῶν γένηται χρεῖα, μὴ τότε παρασκευάζωνται πρὸς τὸ παρακαλούμενον, ἀλλ' ἐτοίμως διακείμενοι πράττωσι τὸ κριθὲν ξυαντῆς. The phrase *βοηθείαις ἐχρῶντο ὑποζωννύντες* matches Appian's phrase *ἐκ τῶν δυνατῶν διαζωννύμενους*: but Appian is speaking of war-ships already provided with *ὑποζώματα*. Apollonios indeed refers to *ὑποζώματα* on the Argo, which was hardly a war-ship: yet he is justified in treating her as such, since he takes her for a ship of fifty oars.

<sup>103</sup> Corp. Inscr. Attic. vol. ii, no. 807, col. c, ll. 66—102, no. 808, col. d, ll. 119—151, no. 809, col. e, ll. 75—110, no. 811, col. c, ll. 11—32. These are the lists of the entire gear (*ἐντελῇ σκεύῃ*) supplied to ships of three and four banks in 330/329 B.C. and following years; and in every case they mention *ὑποζώματα* in the plural, but without any further indication of the number allowed for each ship. The opinion that there were more than three is founded on a

with two girding-cables in addition to the usual set; while every cavalry-transport was supplied with four, and every ship of thirty oars with two, borrowed from the stock of girding-cables intended for the three-banked ships<sup>104</sup>. Such cables would fit the cavalry-transports, as these were old three-banked ships; but would be far too long for the thirty-oared ships, unless each cable made two girdles: in which case a ship of three banks must have been fully twice as long as a ship of thirty oars<sup>105</sup>.

The sides of a war-ship had to be pierced with a row of port-holes for each bank of oars below the first; so that a ship of several banks was almost honey-combed. On the Athenian ships these openings were closed against the water by leathern bags termed *askomata*, which could cling round the oars without much hindrance to their motion<sup>106</sup>; and some protection here was indispensable, as the gap generally was

restoration of no. 809, col. b, l. 131. The words ὑποζώματα ἐπὶ ναῦς ΗΗΔΔΔΙ are followed by καὶ τὸν ||| on the margin of the stone, and this has been restored as καὶ (ὑπο)ζώμα(τα) |||, the ΤΟΝ being changed to ΙΩΜ: but such a restoration seems unwarrantable.

<sup>104</sup> Corp. Inscr. Attic. vol. ii, no. 809, col. a, ll. 1—63, ships of three banks: in each case σκεύη ἔχουσιν ξύλινα ἐντελῇ, κρεμαστὰ ἐντελῇ, καὶ ἕτερα ὑποζώματα ἔλαβον τῶν ἐγλυθέντων δύο κατὰ ψήφισμα δήμου, δ εἶπεν Ἀγνωνίδης Περγασήθεν, ll. 64—90, cavalry-transports: in each case σκεύη ἔχουσιν ξύλινα ἐντελῇ, κρεμαστὰ ἐντελῇ, ὑποζώματα δὲ |||| τριηρικῶν, οἱ τῶν ἐγλυθέντων τριηρικῶν), ll. 91—164, ships of thirty oars: in each case—disregarding minor differences—σκεύη ἔχει ξύλινα ἐντελῇ, κρεμαστὰ, ὑποζώματα τριηρικά τῶν ἐγλυθέντων δύο ἔλαβον κατὰ ψήφισμα δήμου, δ εἶπεν Ἀγνωνίδης Περγασήθεν, col. b, ll. 40—45, a ship of four banks: σκεύη ἔχει κρεμαστὰ ἐντελῇ καὶ ὑποζώματα || τῶν ἐγλυθέντων κατὰ ψήφισμα δήμου, δ εἶπεν Ἀγνωνίδης Περγασήθεν).

<sup>105</sup> See pp. 21, 22, as to the grounds for thinking that the lengths were 70 ft. and 150 ft. respectively.

<sup>106</sup> Corp. Inscr. Attic. vol. ii, no. 791: some of the ships are marked ἡσκῶται, others are marked ἀσκωμάτων ἡ ἀρχὴ ἔχει ΔΔΔΔΙΤΤΗ|| usually abbreviated into ἀσκῶ. ἡ ἀρχὴ ἔχει ΔΔΔΔΙΤΤΗ||, while others are marked ἀσκώματα τριήραρχος always abbreviated into ἀσκῶ. τριήραρχος οἱ ἀσκῶ. τρεῖ. The term ἀσκῶμα must denote a leathern bag of some sort: the cost of a set, 43 drachms 2 obols, shews that each ship had a great many: the expression ἡσκῶται shews that they were fixtures: and a joke by Aristophanes indicates that they were fixed on the ports, Acharnenses, 97, ἀσκῶμ' ἔχεις πού περὶ τὸν ὀφθαλμὸν κάτω.

large enough for a man to put his head through<sup>107</sup>. In the Roman ship of about 50 A.D. in fg. 25 similar bags may be observed around the oars just outside the ports. Curiously, the edges of the ports were not utilized as rowlocks; and the oars of all the lower banks were worked against tholes to which they were fastened by leathern loops, just like the oars above the gunwale<sup>108</sup>.

In the Phœnician two-banked ships of about 700 B.C. in fgs. 10 and 11, and also in the Athenian two-banked ship of about 500 B.C. in fg. 17, the oars of the first bank pass over the gunwale, and the ports of the second bank lie midway between the tholes of the first and somewhat lower down. The ports of the third bank in a three-banked ship would then be placed midway between the ports of the second and somewhat lower down; so that these ports of the third bank would lie vertically below the tholes of the first, while the ports of the second would lie diagonally between: and in the Athenian three-banked ship of about 400 B.C. in fg. 21 the ports of the third bank are approximately in this position<sup>109</sup>. The ports of the fourth bank would then be placed vertically below the ports of the second, the ports of the fifth bank vertically below the ports of the third, and so on, the ports

<sup>107</sup> Herodotos, v. 33, ὁ δὲ δεινὸν τι ποιησάμενος ἐκέλευσε τοὺς δορυφόρους ἐξευρόντας τὸν ἀρχοντα ταύτης τῆς νεὸς, τῷ ὀνόματι ἦν Σκύλαξ, τοῦτον δῆσαι διὰ θαλαμῆς διελόντας τῆς νεὸς κατὰ τοῦτο, ἕξω μὲν κεφαλῇν ποιεῖντας, ἔσω δὲ τὸ σῶμα. With ports of this size there necessarily was some leakage in rough weather in spite of the ἀσκήματα. Arrian, periplus ponti Euxini, 3, κολῆν μὲν γὰρ δι' ὀλίγου τὴν θάλατταν (τὸ πνεῦμα) ἐποίησεν, ὥς μὴ κατὰ τὰς κώπας μόνον, ἀλλὰ καὶ ὑπὲρ τὰς παρεξαιρεσίας ἐπεισεῖν ἡμῶν ἐκατέρωθεν ἀφθόνως τοῦ ὕδατος. Lucilius, in the Anthology, xi. 245, οἱ τοῖχοι, Διόφαντε, τὰ κύματα πάντα δέχονται, | καὶ διὰ τῶν θυρίδων Ὀκεανὸς φέρεται.

<sup>108</sup> Odyssey, viii. 53, ἡρτύναντο δ' ἑρετμὰ τροποῖς ἐν δερματίνουσι. Æschylos, Persæ, 375, ναυβάτης τ' ἀνὴρ | τροποῦτο κώπην σκαλμὸν ἀμφ' εὐήρετμον. Aristophanes, Acharnenses, 553, θαλαμῶν τροπομένων. Vitruvius, x. 3. 6, *etiam remi circa scalmos struppis religati cum manibus impelluntur et reducuntur*. Æschylos and Vitruvius are both speaking of oars generally, not merely of oars above the gunwale, and Aristophanes refers explicitly to a lower bank; so that all the oars must have had these tholes and loops. The loops were known as κωπητήρες or τροπωτήρες as well as τροποί: see note 114 on p. 47. It is clear that the oars were worked against the tholes, and not against the loops: see Aristotle, *mechanica*, 5, quoted in note 115 on p. 48.

being thus kept clear of the ship's ribs : but there is no direct evidence that this system was pursued. If the rowers in *fig. 21* are men of ordinary stature, the gunwale of this three-banked ship must be rather more than three feet above the water-line, and the tholes of the first bank rather more than two feet above the ports of the third : yet clearly there cannot be space enough for the rowers of the first bank to sit vertically above the rowers of the third, or for the rowers of the second bank to sit diagonally between. The three lines of rowers on either side of a three-banked ship would naturally be ranged along three tiers of seats ascending from the centre of the ship like steps, so that each rower in the lower banks could get free play for his oar beneath the legs of a rower in the next bank above. But there are no materials for rigidly determining the relative positions of the lines of rowers in these three-banked ships, or in the larger war-ships.

In the earliest Greek ships the beams formed the upper limit of the hold, and above them were the thwarts for the rowers of the single bank ; these thwarts doubtless being placed in the intervals between the beams, so that the rowers might plant their feet against the beams, and make them

<sup>100</sup> The first two horizontal bands above the water-line seem to be waling-pieces, and the next is unquestionably the gunwale with tholes above for the first bank of oars. The ports of the third bank are just above the lower waling-piece, and almost vertically below the tholes of the first bank. But the ports of the second bank are hard to find. Three sets of bands run downwards from the gunwale, the first to the upper waling-piece, the second to the lower waling-piece, and the third to the water-line ; and these all look like portions of the hull. But apparently the bands that reach the water-line were intended for the oars of the second bank, and should have ended in ports just above the upper waling-piece, though the sculptor has carelessly prolonged them to the gunwale like their neighbours.—These waling-pieces appear again upon the three-banked ship represented in relief on Trajan's Column ; and here the ports of the third bank are between the waling-pieces, and the ports of the second bank unmistakably between the upper waling-piece and the gunwale. The ports of the second bank are probably meant to lie diagonally between the tholes of the first and the ports of the third ; though in that case an oar has been omitted in the third bank, either to avoid confusion, or from mere carelessness. In the first bank the oars are hopelessly entangled in a railing above the gunwale : and altogether the design makes little pretension to accuracy of detail.



serve as stretchers<sup>110</sup>. A second bank of oars could thus be added to a ship without any alteration in her build, simply by seating rowers on the beams and piercing port-holes for their oars<sup>111</sup>; and with a slight increase in her freeboard, a third bank could be added by putting rowers in the hold just underneath the rowers of the first bank. But if the rowers of the first bank sat on thwarts, the rowers of the third bank must have been seated so much lower down that these thwarts were clear of their heads: and the thwarts may have therefore been replaced by planks that did not reach across the ship, so that the rowers of the third bank might be nearly on a level with the rowers of the first, if only they were seated a little further inboard<sup>112</sup>. The beams must then have been

<sup>110</sup> *Odyssey*, ix. 98, 99, τοὺς μὲν ἐγὼν ἐπὶ νῆας ἀγὼν κλαίοντας ἀνάγκη, | νηυσὶ δ' ἐπὶ γλαφυρῆσιν ὑπὸ ζυγὰ δῆσα ἐρύσσας. xiii. 20—22, καὶ τὰ μὲν εὖ κατέθηχ' ἱερὸν μένος Ἀλκυόβοιο, | αὐτὸς ἰὼν διὰ νηὸς ὑπὸ ζυγὰ, μὴ τῶν ἑταίρων | βλάπτει ἐλαυνόντων, ὅπτε σπερχοῖατ' ἑρεμοῖς. cf. *Theognis*, 513, 514, νηὸς τοι πλευνῶσιν ὑπὸ ζυγὰ θήσομεν ἡμεῖς, | Κλεάρισθ', οἳ ἔχομεν χολὰ διδοῦσι θεοί. The ζυγὰ are not mentioned in the *Iliad*; but the compounds πολύζυγος and ἑκατόζυγος occur there, ii. 293, xx. 247. These beams are not to be confounded with the seats. *Iliad*, xv. 728, 729, ἄλλ' ἀνεχάξετο τυτθὸν, διόμενος θανέεσθαι, | θρήνῃν ἐφ' ἑπταπόδην, λιπε δ' ἱκρία νηὸς ἑίστης. This name θρήνυς is preserved in θρανίτης, which denoted a rower of the first bank in ships with more than one bank, while ζυγίτης denoted a rower of the second bank. But the name is changed to κληῖς in the *Odyssey*, ii. 419, ἀν δὲ καὶ αὐτοὶ βάντες ἐπὶ κληῖσι κάθιζον, viii. 37, 38, θησάμενοι δ' εὖ πάντες ἐπὶ κληῖσιν ἑρετμὰ | ἔκβητ', xii. 214, 215, ὑμεῖς μὲν κώπησιν ἀλὲς ῥηγγύνα βαθεῖαν | τόπτετε κληῖδεσσιν ἐφήμενοι, xiii. 76, 77, τοὶ δὲ κάθιζον ἐπὶ κληῖσιν ἑκαστοὶ | κόσμῳ, cf. iv. 579, ix. 103, 179, 471, 563, xi. 638, xii. 146, xv. 221, 549. The κληῖδες are mentioned only once in the *Iliad*, and then in a questionable line, xvi. 170—see note 1 on p. 2—but the compound πολυκλήης occurs several times in the *Iliad* as well as the *Odyssey*. Apollonios Rhodios, i. 395, 396, κληῖδας μὲν πρῶτα πάλῳ διεμοιρήσαντο, | ἀνδρ' ἐντυναμένῳ δοῖω μίαν. Apollonios therefore supposed that the κληῖδες reached right across the ship and seated two rowers apiece: but the expression in the *Odyssey*, xiii. 76, ἐπὶ κληῖσιν ἑκαστοὶ, suggests that each rower was on a separate seat. The expression in the *Iliad*, xv. 729, θρήνῃν ἐφ' ἑπταπόδην, makes it clear that the θρήνυες reached right across the ship. This θρήνυς was apparently the nearest to the stern, so the width thereabouts would thus be seven feet internally: and that is likely enough, as three-banked ships were nowhere more than twenty feet in width: see note 57 on p. 22.

<sup>111</sup> Arrian, *Anabasis*, vi. 5, ὅσαι τε δίκροτοι αὐτῶν τὰς κάτω κώπας οὐκ ἐπὶ πολὺ ἔξω ἔχουσαι τοῦ ὕδατος. Arrian is contrasting the war-ships of two banks with those of a single bank, for there were not any ships of more than two banks in the fleet: so the ships of two banks must have carried oars at a lower level than the ships of one bank.

displaced, if a fourth bank was to be appended to the second as the third was to the first: but there is nothing to shew whereabouts the beams were placed in any of the larger war-ships, or where space was found in three-banked ships for the additional beams that sometimes were inserted to make them seaworthy<sup>113</sup>. To mitigate the roughness of the beams or other seats, every rower was provided with a cushion which he carried about with him from ship to ship<sup>114</sup>.

Ships normally attain their greatest width in the middle and their greatest height at the ends, curving outward and downward from the ends towards the middle. And, according to Aristotle, the nearer amidship a rower sat, the greater was his leverage on his oar, as he had a greater length of oar

<sup>113</sup> Euripides, *Helena*, 1531—1533, Σιδωνίαν ναὺν πρωτόπλουν καθέλκομεν, | ζυγῶν τε πεντήκοντα κάρητμῶν μέτρα | ἔχουσιν. There are here as many ζυγά as oars: and when Theocritus says τριακοντάζυγον Ἀργώ, xiii. 74, he seems to be giving the legendary ship thirty oars instead of fifty, for ships of sixty oars do not appear in legend. This indicates that the rowers now had separate seats, the term ζυγά being applied to seats in any of the banks. Sophocles, *Ajax*, 249, 250, ἡ θοὴν εἰσελάς ζυγὸν ἐξόμενον | ποντοπόρῳ ναὶ μεθεῖναι. Latin authors use *transtra* in this sense. Virgil, *Æneid*, iv. 573, *considete transtris*, v. 136, *considunt transtris, intentaque brachia remis*, etc. cf. Cicero, in *Verrem*, ii. v. 51, quoted in note 129 on p. 56. Virgil and Cicero include ships of three and four banks in these allusions; and such ships could hardly have a tier of beams for every bank of oars. The two-banked ships of the Byzantines certainly had two tiers of beams, ζυγοί, with two rowers on each beam—see note 46 on p. 18—but these were ships of quite another type.

<sup>114</sup> Thucydides, i. 29, καὶ τὰς ναῦς ἅμα ἐπλήρουν, ζεύξαντές τε τὰς παλαιὰς ὥστε πλοῖμους εἶναι καὶ τὰς ἄλλας ἐπισκευάσαντες. Ships in this condition are marked διάζυξ in the inventories of the Athenian dockyards: see *Corp. Inscr. Attic.* vol. ii, no. 809, col. b, l. 45, no. 811, col. b, l. 144, no. 812, col. a, l. 144, and also no. 808, col. a, l. 20, with the fragment in the appendix on p. 515.

<sup>114</sup> Thucydides, ii. 93, ἐδόκει δὲ λαβόντα τῶν ναυτῶν ἕκαστον τὴν κώπην καὶ τὸ ὑπηρέσιον καὶ τὸν τροπωτήρα περὶ ἑῷ εἶναι κ.τ.λ. Plutarch, *Themistocles*, 4, τὸ δόρυ καὶ τὴν ἀσπίδα τῶν πολιτῶν παρελόμενος, εἰς ὑπηρέσιον καὶ κώπην συνέστειλε τὸν τῶν Ἀθηναίων δῆμον. The term ὑπηρέσιον was applied to saddles for horses, cf. Diodoros, xx. 4. 1; so it must here denote some similar covering for the thwarts. Pollux, x. 40, τὸ ναυτικὸν ὑπηρέσιον ἰδίως ἐν ταῖς Ὀραις Κρατίνος προσκεφάλαιον, cf. Hesychios, s.v. πανικτὸν:—Ἑρμιππος ἐν Στρατιώταις, Α. ὥρα τοῖσιν μετ' ἐμοῦ χωρεῖν ἐπὶ κωπητήρα, λαβόντα | καὶ προσκεφάλαιον, ὅ' ἐς τὴν ναὺν ἐμπηδῆσας βοηιάζει. | Β. ἀλλ' οὐ δέομαι, πανικτὸν ἔχων τὸν πρωκτὸν. Cratinos and Hermippos were both contemporary with Thucydides. The τροποί mentioned in the *Odyssey*, viii. 53—see note 108 on p. 44—are here styled τροπωτήρες by Thucydides and κωπητήρες by Hermippos.

inboard by reason of the greater width of the ship<sup>115</sup>. So the lines of rowers did not follow the ship's curve outward. The oars may have increased in length towards the middle of each bank<sup>116</sup>: yet the increase inboard must have been relatively greater than the increase outboard, for otherwise the leverage would have remained the same. So the lines of rowers could not have followed the ship's curve downward, as the oars amidship would then have lost their hold upon the water. And if the lines of rowers did not follow the ship's curve outward or downward, they presumably were straight. The rowers would consequently be seated in a rectangular structure within the ship; and as every rower must have been seated some way inboard to give him the necessary leverage on his oar, this structure would nowhere occupy the whole width of the ship.

<sup>115</sup> Aristotle, *mechanica*, 5, διὰ τί οἱ μεσόνεοι μάλιστα τὴν ναὺν κινουῦσιν; ἡ διότι ἡ κώπη μοχλὸς ἐστίν; ὑπομόχλιον μὲν γὰρ ὁ σκαλμὸς γίνεται—μένει γὰρ δὴ τοῦτο· τὸ δὲ βάρος ἡ θάλαττα, ἣν ἀπωθεῖ ἡ κώπη· ὁ δὲ κινῶν τὸν μοχλὸν ὁ ναῦτης ἐστίν. ἀεὶ δὲ πλεόν βάρος κινεῖ, ὅσω ἂν πλεόν ἀφεστήκη τοῦ ὑπομοχλίου ὁ κινῶν τὸ βάρος. ἐν μέσῃ δὲ τῇ νηὶ πλείστον τῆς κώπης ἐντός ἐστίν· καὶ γὰρ ἡ ναὺς ταύτη εὐρυτάτη ἐστίν, ὥστε πλείον ἐπ' ἀμφοτέρα ἐνδέχεσθαι μέρος τῆς κώπης ἐκατέρου τοίχου ἐντὸς εἶναι τῆς νεώς.

<sup>116</sup> Aristotle, *de partibus animalium*, iv. 10, καὶ ὁ ἔσχατος δὲ (τῶν δακτύλων) μικρὸς ὁρθῶς, καὶ ὁ μέσος μακρὸς, ὥσπερ κώπη μέσον νεώς· μάλιστα γὰρ τὸ λαμβανόμενον ἀνάγκη περιλαμβάνεσθαι κύκλῳ κατὰ τὸ μέσον πρὸς τὰς ἐργασίας. Galen, *de usu partium*, i. 24, διὰ τί δὲ ἄνισοι πάντες ἐγένοντο (οἱ δάκτυλοι) καὶ μακρότατος ὁ μέσος; ἡ ὅτι τὰς κορυφὰς αὐτῶν ἐπὶ ἴσον ἐξικνεῖσθαι βέλτιον ἢ ἐν τῷ περιλαμβάνειν ὅγκους τινὰς μεγάλους ἐν κύκλῳ;.....καθάπερ, οἶμαι, κἄν ταῖς τριήρεσι τὰ πέρατα τῶν κωπῶν εἰς ἴσον ἐξικνεῖται, καίτοι γ' οὐκ ἴσων ἀπασῶν οὐσῶν· καὶ γὰρ οὖν κἄκεῖ τὰς μέσας μεγίστας ἀπεργάζονται διὰ τὴν αὐτὴν αἰτίαν. Aristotle and Galen are apparently asserting here that the oars amidship were longer than the rest. But in the inventories of the Athenian dockyards the oars of a bank are always classed together as though they were all exactly alike. So these assertions may only apply to the aspect of the oars inside the ship. When Galen adds that the ends of the oars all reached equally far, he probably means that the inner ends reached a line parallel to the ship's keel, the oars being of unequal length inboard—he could hardly mean that they reached a curve parallel to the ship's side, the oars being of equal length inboard, for then he would be contradicting Aristotle, *mechanica*, 5: but possibly he means that the outer ends reached a line parallel to the ship's keel, the oars being of equal length altogether but unequal outboard and unequal inboard also, or that they reached a curve parallel to the ship's side, the oars being of unequal length altogether but equal outboard and unequal inboard only.

A heavy superstructure is represented on the Phœnician ships of about 700 B.C. in fgs. 10 and 11 and on the Greek ships of about 550 B.C. in fgs. 15 and 16 and also on the Athenian ship of about 400 B.C. in fig. 21. At the top there is a deck like the hurricane-deck on modern ships. That deck must be the *katastroma*: for these representations tally with the statements of ancient authors that this was the post of the combatants on board Greek ships when in action, while in Phœnician ships it was of larger build, and was occupied by dignitaries during voyages, the space below being fully occupied by rowers<sup>117</sup>. If the rowers in fig. 21 are men of ordinary stature, that hurricane-deck stands about four feet above the gunwale; and about a foot above the gunwale there is another piece of planking. This must be the star-board gangway: for there was a *parodos*, or gangway, on

<sup>117</sup> Thucydides, i. 49, συμμζαντες δὲ ἐναυμάχουν, πολλοὺς μὲν ὀπλίτας ἔχοντες ἀμφοτέρω ἐπὶ τῶν καταστροφωμάτων, πολλοὺς δὲ τοξότας τε καὶ ἀκοντιστάς, τῷ παλαιῷ τρόπῳ ἀπειρότερον ἔτι παρεσκευασμένοι. Plutarch, Themistocles, 14, τὰς μὲν Ἑλληνικὰς οὐκ ἐβλαπτε ναῦς (τὸ κύμα) ἀλιτενεῖς οὐσας καὶ ταπεινοτέρας, τὰς δὲ βαρβαρικὰς ταῖς τε πρύμναις ἀνεστῶσας καὶ τοῖς καταστροφώμασιν ὑψορόφους καὶ βαρείας ἐπιφερομένας ἐσφαλλε προσπίπτον καὶ παρεδίδου πλεγάς τοῖς Ἑλλησιν. Herodotos, viii. 118, αὐτὸς δὲ (Ξέρξης) ἐπὶ νεὸς Φοινίσσης ἐπιβάς ἐκομίζετο ἐς τὴν Ἀσίην. πλώοντα δὲ μιν ἀνεμον Στρυμονίην ὑπολαβείην μέγαν καὶ κυματίνην. καὶ δὴ μάλλον γὰρ τι χειμαίνεσθαι γεμούσης τῆς νεὸς ὥστε ἐπὶ τοῦ καταστροφώματος ἐπεόντων συγχῶν Περσέων τῶν σὺν Ξέρξῃ κομζομένων, ἐνθαῦτα ἐς δεῖμα πεσόντα τὸν βασιλέα εἰρεσθαι βῶσαντα τὸν κυβερνήτηα εἰ τις ἔστι σφί σωτηρή, καὶ τὸν εἶπαι—δέσποτα, οὐκ ἔστι οὐδεμία. εἰ μὴ τούτων ἀπαλλαγὴ τις γένηται τῶν πολλῶν ἐπιβατέων. 119, εἰ γὰρ δὴ ταῦτα οὕτω εἰρέθη ἐκ τοῦ κυβερνήτew πρὸς Ξέρξea, ἐν μυρίησι γυνώμῃσι μίαν οὐκ ἔχω ἀντίξουν μὴ οὐκ ἂν ποιῆσαι βασιλέα τοιοῦνδε, τοὺς μὲν ἐκ τοῦ καταστροφώματος καταβιβάσαι ἐς κοίλῃν νέα ἐόντας Πέρτας καὶ Περσέων τοὺς πρώτους, τῶν δ' ἑρετέων ἐόντων Φοινίκων ὅκως οὐκ ἂν ἴσον πλῆθος τοῖσι Πέρσῃσι ἐξέβαλε ἐς τὴν θάλασσαν. The term *κατάστροφωμα* was habitually applied to the deck for combatants on war-ships: but it also was applied to the upper deck on merchant-ships. Thus the depth of a merchant-ship is reckoned by Lucian, *navigium*, 5, ἀπὸ τοῦ καταστροφώματος ἐς τὸν πυθμένα, ἧ βαθύτατον κατὰ τὸν ἄντλον. cf. Demosthenes, in *Phormionem*, 10, γεγεμεμένης γὰρ ἡδὴ τῆς νεώς, ὡς ἀκούομεν, μάλλον τοῦ δέοντος, προσανέλαβεν ἐπὶ τὸ κατάστροφωμα χιλίας βύρσας, ὅθεν καὶ ἡ διαφθορὰ τῇ νηὶ συνέβη, Synesios, *epistolæ*, p. 178, πλείτω δὲ δεδεμένος ἐπὶ τοῦ καταστροφώματος· μὴ γὰρ εἰς κοίλῃν ναὺν καταβαῖη, ἐπεὶ μὴ θανάμσης εἰ συγχὰ τῶν κεραμῶν ἡμῶδῃ σοι ποιήσει. Indeed, the term was not reserved exclusively for the decks of ships. Athenæos applies it to the flooring or roofing of a battery erected on an armed merchant-ship, v. 43, τείχος δὲ, ἐπάλξεις ἔχον καὶ καταστροφώματα, διὰ νεὸς ἐπὶ κιλλιβάντων κατεσκευάστο· ἐφ' οὗ λιθοβόλος ἐφειστήκει.

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either side of a Greek war-ship; and as combatants were posted on the gangways as well as on the hurricane-deck, these gangways formed part of the upper decking<sup>118</sup>. Thus the upper decking of a Greek war-ship must have consisted of a hurricane-deck, which did not extend from side to side, and two gangways, which were placed a few feet lower down and occupied the remaining width. And the superstructure between the gangways, comprising the hurricane-deck and its vertical supports on either side, would naturally correspond to the rectangular structure below for the rowers, and hence would form the top of that structure.

This hurricane-deck was apparently the only place available for working the supplementary oars known as *perineōi*. The length of these oars on the Athenian three-banked ships was nine cubits or nine and a half, that is to say, thirteen feet and a half or fourteen and a quarter<sup>119</sup>; some change occurring soon after 400 B.C. In the Athenian three-banked ship of this date in fig. 21 the hurricane-deck must be about five cubits above the water-line, and the gangway about two cubits below the hurricane-deck, if those rowers of the

<sup>118</sup> Athenæos, v. 37, τὸ μήκος ἔχουσιν (τὴν ναῦν) διακοσίων ὀγδοήκοντα πηχῶν, δκτῶ δὲ καὶ τριάκοντα ἀπὸ παρόδου ἐπὶ πάροδον, ὕψος δὲ κ.τ.λ. The measurement from *πάροδος* to *πάροδος* is clearly intended for the breadth, so the *πάροδοι* were at the sides; and their name implies that they were gangways. Athenæos is indeed quoting from Callixenos, so the measurement may be false, or the ship imaginary: yet the statement proves that measurement from *πάροδος* to *πάροδος* was a recognized mode of reckoning the breadth of a war-ship. Plutarch, Demetrius, 43, ὁπλίτας δεχομένην (τὴν ναῦν) ἐπὶ τε τῶν παρόδων καὶ τοῦ καταστρώματος ὀλίγη τρισχίλιων ἀποδέοντας. Plutarch is likewise quoting from Callixenos: but the statement proves that combatants were normally posted on the *πάροδοι* of a war-ship. In the passage already quoted in note 35 on p. 14 Memnon speaks of the combatants as οἱ ἀπὸ τῶν καταστρωμάτων μαχησόμενοι, and the *πάροδοι* and *κατάστρωμα* may here be classed together as *καταστρώματα*: but apparently the plural was treated as equivalent to the singular, cf. Pausanias, i. 29, πλοῖον καθήκον ἐς ἑνέα ἑρέτας ἀπὸ τῶν καταστρωμάτων. According to the present reading, Thucydides says καὶ αὗται οὕτω εἶχον διὰ πάσης καταστρώματα, i. 14, in speaking of the ships built by the Athenians under Themistocles, as though their ships afterwards had *καταστρώματα διὰ πάσης νεώς*, which might mean that these hurricane-decks reached right across the ship and left no space for gangways. But the words *διὰ πάσης* must be a corruption of some word connected with *διάβασις*. cf. Plutarch, Cimon, 12, ὥρμησεν (Κίμων) ἄρας ἀπὸ Κνίδου καὶ Τροπίου διακοσίας τρήρεσι. ποδὲς μὲν τάχος ἀπ' ἀρχῆς καὶ περιαγωγῆν ὑπὸ Θεμιστοκλέους ἀριστα

upper bank are men of ordinary stature: and as the gangway would hardly be more than a cubit in width, an oar of nine cubits and a half might dip quite a cubit and a half in the water, if worked from the hurricane-deck with seven cubits and a half outboard and two cubits inboard. Some oars are certainly being worked from the hurricane-deck in the Athenian ship of about 600 B.C. in fig. 14: and these presumably are *perineōi*, since they are not in the banks. And if half a bank was allotted to these supplementary oars in the ships termed *triemioliai*, this may have been because there was not any hurricane-deck<sup>120</sup>.

War-ships generally were classed by the Greeks as *kataphraktoi* or *aphraktoi*, that is to say, completely fenced or unfenced: and these terms would well denote the presence or absence of a line of screens on either side to close the open space between the hurricane-deck and the gangway, and thus protect the rowers of the upper bank from missiles<sup>121</sup>. In the Egyptian ships of about 1000 B.C., as in fig. 6, the rowers on either side were protected by a long screen above the gunwale; and similar screens are mentioned in the Odyssey,

κατεσκευασμέναις, ἐκεῖνος δὲ τότε καὶ πλατυτέρας ἐποίησεν αὐτὰς καὶ διάβασιν τοῖς καταστρώμασιν ἔδωκεν. In this context διάβασις would mean *breadth*, as in Hippocrates, *epistolæ*, 14, οἶδα παρὰ σοὶ γενόμενος ἐν Ῥόδῳ, Δαμάγῃτε, τὴν ναὺν ἐκέλευν—Ἄλλας ἐπιγραφὴ ἦν αὐτῇ—πάγκαλόν τινα καὶ εὐρυμνον, ἱκανῶς τε τετροπωμένην, καὶ διάβασιν εἶχε πολλήν. Thus, as the ships were themselves made broader, the hurricane-decks could also be made broader without encroaching on the space required for the gangways.

<sup>119</sup> Corp. Inscr. Attic. vol. ii, no. 789, col. a, l. 14, *περὶνεως (ἔχει) ΔΔΓΙΙΙΙ*, *ἀδόκιμον* |, *ἐννεαπήχεις καὶ σπιθαμ(α)ίας*, l. 51, *περὶνεψ ἐννέα πήχεων καὶ σπιθαμῆς*. The length of the other oars is never stated, so the length of these would not be stated unless it varied: and the words *αὐται ἐννεαπήχεις* and *τούτων ἐννεαπήχεις* □ occur in ll. 22, 55, where they must refer to the *περὶνεψ*. The inscription belongs to the archonship of Asteios, 373/2 B.C.

<sup>120</sup> See p. 15 as to these ships and their oars.

<sup>121</sup> The words *φράσσειν* and *φραγμός* or *φράγμα* properly refer to fences; and the *κατὰ* in *κατάφρακτος* clearly means that the ship was fenced completely, not that she was fenced down or decked, for then *κατάφρακτος* would be opposed to *ἀκατάφρακτος* instead of *ἀφρακτος*. cf. Arrian, *anabasis*, vii. 16, *ναυπηγεῖσθαι ναὺς μακράς, ἀφράκτους τε καὶ πεφραγμένας*. Apparently the *κατὰ* in *κατάστρωμα* also indicates completeness, like the *con* in *constratum*, the *στρώμα* and *stratum* indicating sufficiently that the deck was laid down. Cicero opposes *constratus* to

but only as bulwarks for the water<sup>122</sup>. Screens for missiles, however, were probably in use on the Phœnician war-ships of about 700 B.C. : for there are certain square objects upon the superstructure of the ship in fig. 10, which has a ram and must therefore be a war-ship ; and these are absent from the ship in fig. 11, which has no ram and therefore cannot be a war-ship ; so they certainly served some purpose in warfare, yet seem unserviceable unless they could be lowered to protect the rowers. Had there been such screens on the Athenian war-ship of about 400 B.C. in fig. 21, they would doubtless have fitted into the gaps between the supports of the hurricane-deck. In the Athenian war-ships the rowers were also protected against sun and spray by awnings termed *pararrhymata* or *parablemata*, which were spread along each side to cover the open space below the hurricane-deck. Every

*apertus* in describing ships with and without a *kardotpwma*, in Verrem, ii. v. 40, *poterone in eos esse vehemens, qui naves non modo inanes habuerunt sed etiam apertas: in eum dissolutus, qui solus habuerit constratam navem et minus exinanitam?* cf. Aulus Hirtius, de bello Alexandrino, 11, *quattuor constratae naves et complures apertae*. But he simply transliterates *ἀφρακτος*, ad Atticum, v. 13. 1, *navigavimus sine timore et sine nausea: sed tardius, propter aphractorum Rhodiorum imbecillitatem*, cf. v. 11. 4, 12. 1, vi. 8. 4. And Livy says *naves tectas*, xxxiii. 30, where Polybios says *καταφράκτους ναῦς*, xviii. 27, in citing the same document. Now, if these screens closed the open space below the hurricane-deck, a ship could not be *κατάφρακτος* unless she had a *καρδότρωμα*, so that every *navis tecta* would be *constrata* but no *navis aperta* would be *tecta*. Thus Livy uses the terms indifferently, xxxvi. 42, *C. Livius, praefectus Romanae classis, cum quinquaginta navibus tectis profectus, ... quum sex Punicas naves ad auxilium missas accepisset, ... Piræum ad veterem classem pervenit. a Piræo A. Atilius, traditis successori quinque et viginti navibus tectis, Romam est profectus: Livius una et octoginta constratis navibus Delum traiecit*. 43, *Eumenes cum quattuor et viginti navibus tectis, apertis pluribus paullo, ad Romanos rediit. inde centum quinque navibus tectis, etc.* cf. Appian, de rebus Syriacis, 22, *καὶ τὸν ὑπ' Ἀττίλῳ στόλον παραλαβὼν, ἐπλεῖ (Ἀλβίος) καταφράκτοις ὀδοήκοντα καὶ μὴ, ἐπομένου καὶ ῥύμενοῦς πεντήκοντα ἰδίας* καὶ ἣν κατάφρακτον καὶ τῶνδε τὸ ἥμισυ. The decked and undecked merchant-ships were distinguished in Greek by other terms. Antiphon, de cæde Herodis, 22, *ἐν ᾧ μὲν γὰρ ἐπλόμεν, ἀστέγαστον ἦν τὸ πλοῖον, εἰς δὲ μετέβημεν, ἐστέγασμένον* τοῦ δὲ ὑποῦ ἕνεκα ταῦτ' ἦν. See also note 126 on p. 55 for this use of *στέγη* and *stega*.

<sup>122</sup> Odyssey, v. 256, 257, *φράξε δὲ μιν ῥίπεσσι διαμπερὲς ὀλυνήσῃ | κύματος ἑλαρ ἔμειν*. Bulwarks of this rough sort were sometimes made to serve as a defence against missiles. Cæsar, de bello civili, iii. 24, *virtute militum confusus, scaphas navium magnarum circiter sexaginta cratibus pluteisque contexiit, eoque milites delectos imposuit, etc.*

ship carried two pairs of these, one pair of sail-cloth and the other of horse-hair or possibly of hide. Two other awnings were carried on these ships to cover some other spaces, a *katablema* for above and a *hypoblema* for below: but the exact position of these is doubtful<sup>128</sup>.

A later arrangement of the upper decking may be seen in the Roman two-banked ship of about 50 A.D. in fig. 25. The oars of the upper bank here pass through ports, instead of passing over the gunwale: and as the rowers of the upper bank are therefore lower down in the ship, the deck above their heads is also lower; so that this deck for combatants no longer forms a hurricane-deck, but now stands between bulwarks which represent the former lines of screens, whilst the gangways retain their place outside.

<sup>128</sup> Corp. Inscr. Attic. vol. ii, no. 809, col. e, ll. 75—110, no. 811, col. c, ll. 11—32: these are the lists of gear for three-banked ships and four-banked ships in 325/4 B.C. and 323/2 B.C.—at present there is no list for 324/3 B.C. Both lists include *καταβλήματα* and *παραρρύματα λευκά* and *παραρρύματα τρίχυνα* for three-banked ships and for four-banked ships: but the earlier list includes *υποβλήματα* for three-banked ships only, and the later list does not include them at all. These discrepancies indicate that the *υποβλήματα* were discarded about that date upon the three-banked ships, and never came into use upon the four-banked ships: cf. no. 807, col. c, ll. 66—102, no. 808, col. d, ll. 119—151. A list of gear in store in 357/6 B.C. shews that each three-banked ship used to have a pair of *παραρρύματα* of each sort, but only one *κατάβλημα* and one *υπόβλημα*, no. 793, col. e, ll. 6—21. A list of ships some twenty years before incidentally mentions *παραβλήματα*, no. 791, l. 31. Two instances of the use of *παραρρύματα* and *παραβλήματα* in 406 and 405 B.C. are mentioned by Xenophon, *Hellenica*, i. 6. 19, *τοὺς ἐπιβάτας εἰς κολίην ναὺν μεταβιβάσας καὶ τὰ παραρρύματα παραβαλὼν*, ii. 1. 22, *πάντα δὲ παρασκευασάμενος ὡς εἰς ναυμαχίαν καὶ τὰ παραβλήματα παραβαλὼν*. In both instances a fight was expected; yet the *παραρρύματα* and *παραβλήματα* were not spread to protect the crew, but to conceal the crew for a surprise: so they were spread over the open spaces below the hurricane-deck, for here alone would the crew be visible. Thus the *παραβλήματα* may merely be the *παραρρύματα* under another name, which ranges better with *καταβλήματα* and *υποβλήματα*. In the arsenal the *παραρρύματα λευκά* were stored in the same chests with the sails, and so were probably of similar material. Corp. Inscr. Attic. vol. ii, no. 1054, ll. 85—87, *ποιήσει δὲ καὶ κιβωτοὺς τοῖς ἱστίοις καὶ τοῖς παραρρύμασιν τοῖς λευκοῖς, ἀριθμὸν ἑκατὸν τριάκοντα τέτταρας*. The other *παραρρύματα* were perhaps of horse-hair, for that seems the likeliest meaning of *τρίχυνα*, but were possibly of hide. cf. Cæsar, *de bello civili*, iii. 15, *pellibus, quibus erant tecta naves*. The *καταβλήματα* and *υποβλήματα* were presumably of some similar material; and certainly were not of timber, for in the lists they are classed with the *παραρρύματα* amongst the *σκεύη κρεμαστά*, which are distinguished from the *σκεύη ξύλινα*.



The three-banked ships were termed *triremes* in Latin and *triēreis* in Greek: but while the Latin term implies a triple arrangement for the oars, the Greek term implies a triple arrangement of some undetermined sort; and the cognate adjective *triarmenoi* was applied to large sailing-ships, which had not any banks of oars<sup>124</sup>. These sailing-ships, however, used often to have three decks. Thus, while Plutarch and Proclus describe a ship as *triarmenos*, Athenæos describes her as *triparodos*, that is to say, with three gangways; and states that these gangways stood one above another, and gave access to cabins along the sides and at the ends: so that this clearly was a three-decked ship, though apparently the planking of the decks did not extend over the whole

<sup>124</sup> The older form of *triremis* was *triresmus*, cf. Corp. Inscr. Latin. vol. i, no. 195, l. 12, *triresmosque naveis*: and both these forms are connected with *ἐρεσμός* and *ἐρέσσειν*, whereas *τρήρης* is connected with *ἄρειν*, and thus with *ἄρμενος*. The term *τρίαρμενος* was introduced about 100 A.D.; but not to designate a novel type of ship, for it is applied to ships of earlier times by Pollux, i. 83, *καὶ Πτολεμαίου ναῦς, πεντεκαίδεκῆρης· καὶ Ἀντιγόνου, τρίαρμενος*, and by Plutarch and Proclus in the passages quoted in note 74 on p. 28. The term is employed by Lucian, *navigium*, 14, *πέντε γάρ, εἰ βούλει, καλλίω καὶ μείζω τοῦ Ἀλγυπτίου πλοίου ἥδη ἔχει, καὶ τὸ μέγιστον οὐδὲ καταδύναϊ δυνάμενα,.....ὅς γάρ ἐτι ἐνὸς πλοίου τούτου δεσπότης ὢν παρήκουες βοώντων, εἰ πέντε κτήσαιο πρὸς τούτῳ τρίαρμενα πάντα καὶ ἀνώλεθρα, οὐδὲ ὅψει δηλαδὴ τοὺς φίλους*. Again by Lucian, *Lexiphanes*, 15, *ὀλκὰδα τρίαρμενον ἐν οὐρίῳ πλέουσιν, ἐμπεπνευματωμένον τοῦ ἀκατείου, εὐφοροῦσάν τε καὶ ἀκροκυματοῦσαν*, cf. *pseudologistae*, 27, *μικροῦ γούρ φασιν ἀποπνιγῆναι σε ναύτη τινὶ τῶν τριαρμένων ἐντυχόντα, ὅς ἐμπεσὼν ἀπέφραξέ σοι τὸ στόμα*. Also by Philostratus, *vita Apollonii*, iv. 9, *καὶ ἅμα διῶν ταῦτα ναὺν εἶδε τῶν τριαρμένων ἐκπλέουσιν καὶ τοὺς ναῦτας ἄλλων ἄλλως ἐς τὸ ἀνάγεσθαι αὐτὴν πράττοντας*. cf. Synesios, *epistolæ*, p. 161, *ταχύ μὲν τὴν γῆν ἀπεκρύπτομεν, ταχύ δὲ μετὰ τῶν ὀλκᾶδων ἡμεν τῶν διαρμένων*.

<sup>125</sup> Athenæos, v. 41, *ἣν δ' ἡ ναὺς τῇ μὲν κατασκευῇ εἰκόσροπος, τριάρδος δέ, τὴν μὲν κατωτάτῳ ἔχουσα ἐπὶ τὸν γόμον, ἐφ' ἣν διὰ κλιμάκων πυκνῶν ἡ κατάβασις ἐγένετο· ἡ δ' ἑτέρα τοῖς εἰς τὰς διαίτας βουλομένοις εἰσιέναι μεμηχανητο· μεθ' ἣν ἡ τελευταία τοῖς ἐν τοῖς ὅπλοις τεταγμένοις. ἦσαν δὲ τῆς μέσης παρόδου παρ' ἑκάτερον τῶν τοίχων διαίται τετράκλινοι τοῖς ἀνδράσι, τριάκοντα τὸ πλῆθος. ἡ δὲ ναυκληρικὴ διαίτα κλινῶν μὲν ἦν πεντεκαίδεκα, θαλάμους δὲ τρεῖς εἶχε τρικλίνους, ὧν ἦν τὸ κατὰ τὴν πρῶταν ὀπτανίον. κατὰ δὲ τὴν ἀνωτάτῳ πάροδον γυμνάσιον ἦν, καὶ περίπτοι, κ.τ.λ.* For a further account of the structures on the upper *πάροδος*, see note 133 on p. 58. The ship here described as *τριάρδος* is described as *τρίαρμενος* by Plutarch and by Proclus in the passages quoted in note 74 on p. 28. Athenæos is quoting here from Moschion, and applies the term *πάροδοι* to the three decks of the ship; whereas in quoting from Callixenos—see note 118 on p. 50—he applies the term to a pair of gangways along the two sides of the ship: but Moschion seems to be

ship, but left the centre open<sup>125</sup>. And the term *triereiis* was itself applied by certain authors to three-decked ships, and even to three-storied buildings<sup>126</sup>; while in the Septuagint the Ark is described as *triorophos*, that is to say, with three stories, though in the original its triple arrangement is of an undetermined sort<sup>127</sup>. The three-banked war-ships may therefore have inherited the name *triereiis* from three-decked ships of earlier date: but they never had three decks themselves. The rowers of the lower bank were indeed styled *thalamitai*, as if they had originally sat in a *thamos*, or chamber: but the rowers of the middle bank were styled *zygitai*, as if they had originally sat upon the *zyga*, or beams; and if the beams served as seats, they could not carry a deck,

reckoning each pair of gangways as a single structure, for he states explicitly that the middle *πάροδος* had cabins on each side of the ship. Possibly the open space between the gangways was covered over by a deck corresponding to the *κατάστρωμα* on a war-ship, so that the ships described as *τριπάροδοι* or *τριάρμενοι* really had four decks altogether. Thus, Lucian reckons the depth of a merchant-ship *ἀπὸ τοῦ καταστρώματος*, *navigium*, 5, and she was one of the *πλοῖα τριάρμενα*, *navigium*, 14. Cabins at the stern are mentioned by Lucian, *navigium*, 5, *αἱ κατὰ τὴν πρύμναν οἰκῆσεις*—cf. Lucan, ix. 110, 111, *rubrisque cavernis | delituit*—and these probably answer to Moschion's *ναυκληρικὴ βλαῖτα* and its *θάλαμοι*, the *dieta magistri* of Petronius, *satiræ*, 115.

<sup>125</sup> Etymologicum Magnum, s. v. *διήρης*:—'Ἀπολλώνιος δὲ καὶ τὰς ναὺς τὰς ἐχούσας δύο ἢ καὶ τρεῖς στέγας διήρεις καὶ τριήρεις λέγει. This obviously does not imply that the three-banked ships had three decks themselves: it merely shews that this author applied the name for three-banked ships to three-decked ships also. The author may be either Apollonios or Apollodoros, as the reading is doubtful. For this sense of *στέγη*, cf. Plautus, *Bacchides*, ii. 3. 44, Stichus, iii. 1. 12, *in stega*. Ælius Aristides, *panegyrica in Cyzico*, p. 420, *ἀντὶ γὰρ τῶν οἰκῶν τῶν τριωρόφων καὶ τῶν τριήρων πάρεστιν ὁρᾶν νεῶν τὸν μέγιστον, τῶν μὲν ἄλλων πολλαπλασίονα, αὐτὸν δὲ τριπλοῦν τῇ φύσει. τὰ μὲν γὰρ αὐτοῦ κατάγειός ἐστι θέα, τὰ δ' ὑπερῶς, μέση δὲ ἡ νεομοσμένη. δρόμοι δὲ ὑπὸ γῆν τε καὶ κρεμαστοὶ δι' αὐτοῦ διήκοντες κύκλῳ, ὥσπερ οὐκ ἐν προσθήκης μέρει, ἀλλ' ἐξεπίτηδες εἶναι δρόμοι πεποιημένοι. The interior of this temple thus bore some resemblance to the interior of a three-decked ship, as described by Athenæus in the passage quoted in the last note: and this resemblance may have led Aristides to use the term *τριήρης* in his comparison. See also Athenæus, ii. 5, as to a dwelling-house known as *τριήρης* at Agrigentum: he quotes the story from Timæus.*

<sup>127</sup> Genesis, vi. 15, *καὶ οὕτω ποιήσεις τὴν κιβωτὸν*, 16, *κατάγαυα, διώροφα καὶ τριώροφα ποιήσεις αὐτήν*. A fourth deck is mentioned by Philo Judæus, *vita Moysis*, ii. 11, *καὶ συνεχῇ κατασκευασάμενος ἐνδον οἰκήματα, ἐπίπεδα καὶ ὑπερῶα, τριώροφα καὶ τετρώροφα*. And also by Josephus, *de antiquitatibus Judaicis*, i. 3. 2, *λάρνακα τετράστεγον κατασκευάσας*.

and the space below could only figuratively be termed a chamber. Moreover, there is a characteristic little jest of Aristophanes to prove that in his day the rowers of the middle and lower banks had no deck between them<sup>128</sup>. And Xenophon speaks as though the rowers of all three banks had to pull together to avoid collision with each other<sup>129</sup>.

The earliest Greek ships had little decks at stem and stern, somewhat above the level of the beams<sup>130</sup>; and similar decks are represented on Egyptian and Asiatic ships of still earlier date, as in fgs. 4 to 8, the bulwarks marking their extent. But on Greek ships of about 500 B.C., as in fgs. 17 and 19, the forecastle appears without the poop; and

<sup>128</sup> Aristophanes, *ranæ*, 1074, καὶ προσπαρεῖν γ' εἰς τὸ στόμα τῶ θαλάμακι. But see Appian, *de bellis civilibus*, v. 107, ὁ δὲ Ἀγρίππας ἰερο μάλιστα εὐθὺ τοῦ Παπίου, καὶ αὐτῷ κατὰ τὴν ἐπωτίδα ἐμπέσειε τὴν ναὺν καὶ ἐς τὰ κοῖλα ἀνέβρηξεν· ἡ δὲ τοὺς τε ἐν τοῖς πύργοις ἀπεσεύσατο, καὶ τὴν θάλασσαν ἀθρόως ἐδέχετο· καὶ τῶν ἐρετῶν οἱ μὲν θαλαμίαι πάντες ἀπελήφθησαν, οἱ δ' ἕτεροι τὸ κατὰ-στρωμα ἀναβρήξαντες ἐξενήχοντο. This was in an action off Mylæ in 36 B.C. The incident rather suggests that there was a deck just above the rowers of the lower bank, since they were all drowned, while the rest escaped. But as the survivors had to make their escape by breaking through the upper decking, the rowers of the lower bank may have been delayed until too late by the crowd above. See also Silius Italicus, xiv. 424—426, *trepidatur omisso | summis remis: sed enim iam rebus in arctis | fama mali nondum tanti penetrarat ad imos*. But this cannot reasonably be taken to imply a deck between the banks.

<sup>129</sup> Xenophon, *economica*, 8. 8, καὶ τῆρης δέ τοι ἡ σεσαγμένη ἀνθρώπων διὰ τί ἄλλο φοβερὸν ἐστὶ πολεμίοις ἢ φίλοις ἀξιοθέατον ἢ ὅτι ταχὺ πλεῖ; διὰ τί δὲ ἄλλο ἄλυκοι ἀλλήλοις εἰσὶν οἱ ἐμπλέοντες ἢ διότι ἐν τάξει μὲν κάθηται, ἐν τάξει δὲ προνεύουσιν, ἐν τάξει δ' ἀναπίπτουσιν, ἐν τάξει δ' ἐμβαίνουνσι καὶ ἐκβαίνουνσι; But although they had thus to pull together when they were all at work, one set could go on working while another stopped. Thucydides, iii. 49, οἱ μὲν ὄνον ἤρουντο κατὰ μέρος, οἱ δὲ ἤλυνον. Xenophon, *Hellenica*, vi. 2. 29, εἰ μὲν αὖρα φέροι, θέοντες ἅμα ἀνεπαύοντο· εἰ δὲ ἐλαύνειν δεοί, κατὰ μέρος τοὺς ναῦτας ἀνέπαιναν. Polyænos, v. 22. 4, τοῖς δὲ ἐρέταις (παραγγεῖλαις) ἀνὰ μέρος ὅτε μὲν τὰς θαλαμίας, ὅτε δὲ τὰς ῥυγίας, ὅτε δὲ τὰς θρανίτιδας κώπας ἀναφέρειν. The stratagem here was to make the enemy believe that the ships were fully manned, when there really were only hands enough for one bank of oars: but the enemy would not have been deceived, unless the three banks were often worked separately. Of course, there was space enough in the hold for the combatants as well as the rowers: Xenophon, *Hellenica*, i. 6. 19, τοὺς ἐπιβάτας εἰς κοίλην ναὺν μεταβιβάσας. But there was no space to spare: Cicero, in *Verrem*, ii. v. 51, *ea est enim ratio instruitarum ornatarumque navium, ut non modo plures, sed ne singuli quidem possint accedere... classem instructam atque ornata fuisse, nullum propugnatorem abfuisse, nullum vacuum transtrum fuisse*.

on Greek ships of somewhat later date, as in fig. 23, and even on the ship of earlier date in fig. 15, the bulwarks of this forecastle are represented as supporting the fore part of a hurricane-deck and enclosing a cabin underneath. Some such forecastle was wanted on the war-ships, as their bows sloped down to meet the ram: but the merchant-ships had clipper bows high out of water; and by about 500 B.C. the forecastle had already been deprived of bulwarks on vessels of that class, as may be seen from fig. 18, and apparently was on a level with the ordinary deck amidship. The stern now held a tier of seats for the steerer and others in command; but this did not necessitate a separate deck there<sup>131</sup>.

<sup>130</sup> Odyssey, v. 163, 164, ἀτὰρ ἱκρία πῆξαι ἐπ' αὐτῆς | ὑψοῦ, ὥς σε φέρησιν ἐπ' ἡεροειδέα πόντον, 252, 253, ἱκρία δὲ στήσας, ἀραρὼν θαμέσι σταμένεσσι, | πολεῖ. xii. 229, 230, εἰς ἱκρία νηὸς ἔβαινον | πρῶρης, 411—414, ὁ δ' ἄρα πρύμνῃ ἐνὶ νηὶ | πλῆξε κυβερνήτῳ κεφαλὴν, σὺν δ' ὅστέ' ἀραξεν | πάντ' ἀμνυὶς κεφαλῆς· ὁ δ' ἄρ' ἀρνευτήρι ἐοικὼς | κάππεσ' ἀπ' ἱκρίοφιν. xiii. 73—75, καὶ δ' ἄρ' Ὀδυσσῆι στόρεσαν ῥῆγός τε λῖνων τε | νηὸς ἐπ' ἱκρίοφιν γλαφυρῆς, ἵνα νῆγρετον εὐδοί, | πρύμνης. cf. iii. 353, xv. 283, 552; also Iliad, xv. 685, 729. The term is used in prose by Synesios, epistolæ, p. 161, ἐπὶ τῶν ἱκρίων ἐστὼς, and also by Heliodoros, Æthiopica, v. 24, τῶν μὲν εἰς τὰ κοῖλα τῆς νεῶς καταδυομένων, τῶν δὲ πρὸς μάχην ἐπὶ τῶν ἱκρίων ἀλλήλοις παρακελευομένων. Pliny, vii. 57, *lectas longas (naves invenere) Thasis: antea ex prora tantum et puppi rugnabatur*. This probably answers to the statement in Thucydides, i. 10, οὐδ' αὖ τὰ πλοῖα κατάφρακτα ἔχοντας, ἀλλὰ τῷ παλαιῷ τρόπῳ ληστικώτερον παρεσκευασμένα. As to the statement in Thucydides, i. 14, καὶ αὗται οὐκ εἶχον διὰ πάσης καταστρώματα, see note 118 on p. 50. And see note 121 on p. 51 for the meaning of *lectas* and *κατάφρακτα*.

<sup>131</sup> Ptolemy, Almagest, viii. 1, Ἄργουσι ἀστερισμός, employs the phrase ἐν τῷ καταστρώματι τῆς πρύμνης: but this does not imply that the ship had a separate deck at the stern, any more than his phrase ἐν τῇ τρώπῃ τῆς πρύμνης implies that she had a separate keel there. So also Petronius employs the phrase *supra constratum puppis*, satiræ, 100; the construction being determined by the context *ut supra constratum navis occuparemus secretissimum locum*. The same interpretation must be placed upon the phrase in Aulus Gellius, xvi. 19, *stansque in summa puppis foro*. This is a translation from Herodotos, i. 24, who speaks of Arion στάντα ἐν τοῖσι ἐδωλοῖσι while the robbers ἀναχωρῆσαι ἐκ τῆς πρύμνης ἐς μέσσην νέα. cf. Euripides, Helena, 1571, Ἑλένη καθέξεται ἐν μέσοις ἐδωλοῖς, 1602, 1603, παρακέλευσμα δ' ἦν | πρύμνηθεν Ἑλένης. These ἐδῶλια at the stern were presumably a set of seats, the term ἐδῶλια being equivalent to *sedilia* in Latin. Virgil, Æneid, v. 837, *sub remis fusi per dura sedilia nautæ*. For the other ἐδῶλιον that held the mast, see note 196 on p. 91. Apparently, the term *ζυγόν* served also to denote some bench at the stern. Æschylos, Agamemnon, 1617, 1618, σὺ ταῦτα φωνεῖς, νερτέρᾳ προσήμενος | κώπη, κρατούντων τῶν ἐπὶ ζυγῷ δορός; cf. Euripides, Cyclops, 14, 15, ἐν πρύμνῃ δ' ἄκρα | αὐτὸς λαβὼν εὐθυρον

Ships generally had a deck-house at the stern for the commander and his friends, sometimes constructed solidly, but oftener of wicker-work or merely of awnings<sup>132</sup>. The heavier type is represented on the Roman merchant-ship in fig. 29, and the lighter type on the Roman war-ship in fig. 35. Some ships had deck-houses all along the upper decking; and these were fitted with every luxury, baths of bronze and marble in the bath-room, paintings and statues and mosaics in the principal saloons, and even a library of books. And alongside these deck-houses there were covered walks with rows of vines and fruit-trees planted in flower-pots<sup>133</sup>.

ἀμφήρες δόρυ. This *ζυγόν* may answer to the *iuga longa* of Virgil, *Æneid*, vi. 411, 412, *inde alias animas, quæ per iuga longa sedebant, | deturbat, laxatque foros*: for the ghosts here were not on board as rowers, so these *iuga* would not be the rowers' seats, nor could those seats be described as *longa*.—In this passage Virgil calls the deck *fori*, whereas Aulus Gellius calls it *forus*: but singular and plural were used indifferently. Sallust, apud Nonium, p. 106, *illum nautis forum*. Cicero, de senectute, 6, *alii per foros curgent*. Lucan, iii. 630, *ad summos repleta foros, desedit in undas*, sc. *navis*. Ennius, apud Isidorum, origines, xix. 2. 4, *multa foro ponit et agea longa repletur*, where *agea* or *αγνιά* is probably a synonym for *πόρος*. These terms *forus* and *fori* must convey the notion of an open space, like *Forum*; and hence denote a deck. Ammianus, xxvii. 5. 2, *ponteque contabulato supra navium foros flumen transgressus est Histrum*.

<sup>132</sup> Herodotos, vii. 100, ὡς δὲ ταῦτά οἱ ἐπεποίητο, τῶν νεῶν κατελκυσθεισῶν ἐς θάλασσαν, ἐνθαῦτα ὁ Ψέρξης μετεκβάς ἐκ τοῦ ἄρματος ἐς νέα Σιδωνίην ἔζετο ὑπὸ σκηνῇ χρυσῇ καὶ παρέπλωε παρὰ τὰς πύρας τῶν νεῶν. Arrian, *anabasis*, vi. 13, καὶ πλέων κατὰ τὸν ποταμὸν, ὡς ἐπέλαξεν ἡ ναὺς ἥδη τῷ στρατοπέδῳ τὸν βασιλέα φέρουσα, κελεύει δὴ ('Αλέξανδρος) ἀφελεῖν τὴν σκηνὴν ἀπὸ τῆς πύρνης, ὡς καταφανὴς εἶναι πᾶσιν. Chariton, viii. 6, εἰσέπλευσεν οὖν τριήρης ἡ Χαίρεος πρώτη. εἶχε δ' ἐπάνω σκηνὴν συγκεκαλυμμένην βαθυλωνίους περιπετάσμασιν... αἰφνιδίον εἰλκύσθη τὰ παραπετάσματα, καὶ ὥφθη Καλλιβρόη, κ.τ.λ. Tacitus, *annales*, xiv. 5, *Crepereius Gallus haud procul gubernaculis adstabat, cum dato signo rueret tectum loci multo plumbo grave; pressusque Crepereius et statim exanimatus est*. cf. Suetonius, Nero, 34, *cameræ ruina*. Sidonius, *epistolæ*, viii. 12, *hic, superflexa crate paradarum, sereni brumalis infida vitabis*. Ausonius, *epistolæ*, 5. 28, 29, *Medullini te feret ora noti | expositum subter paradas*.

<sup>133</sup> Athenæos, v. 41, κατὰ δὲ τὴν ἀνωτάτῳ πόροδον γυμνάσιον ἦν, καὶ περίπατοι, σύμμετρον ἔχοντες τὴν κατασκευὴν τῷ τοῦ πλοίου μεγέθει, ἐν οἷς κῆποι παντοῖοι θαυμασίως ἦσαν περιβάλλοντες ταῖς φυτεῖαις, διὰ κεραμίδων μολυβδινῶν κατεστεγανωμένοι. ἔτι δὲ σκηναὶ κитτοῦ λευκοῦ καὶ ἀμπέλων, ὧν αἱ ῥίζαι τὴν τροφήν ἐν πῖθιοις εἶχον γῆς πεπληρωμένοις, τὴν αὐτὴν ἀρδευσιν λαμβάνουσαι καθάπερ καὶ οἱ κῆποι. αἰσται δὲ αἱ σκηναὶ συνεσκίαζον τοὺς περιπάτους. ἐξῆς δὲ τούτων Ἀφροδίσιον κατεσκεύαστο τρίκλινον, δάπεδον ἔχον ἐκ λίθων ἀχατῶν τε καὶ ἄλλων χαριεστάτων, ὅσοι κατὰ τὴν νῆσον ἦσαν· τοὺς τοίχους δ' εἶχε καὶ τὴν ὀροφὴν κυκαρίττου, τὰς δὲ θύρας

Ships also carried turrets on the upper decking to enable their crews to shoot down missiles on an enemy<sup>124</sup>; and merchant-ships carried them as much as war-ships, since they had often to encounter pirates. These turrets could easily be set up and taken down again, their foundations alone being fixtures in the hull: and apparently those foundations sometimes projected overboard, as though the turrets reached right across the ship or else were placed in pairs on either side. A merchant-ship might carry as many as eight, two in the bows, two near the stern, and four amidship; and such turrets might contain three stories each, and thus be fully twenty feet in

ἐλέφαντος καὶ θούου· γραφαῖς δὲ καὶ ἀγάλμασιν ἐτι δὲ ποτηρίων κατασκευαῖς ὑπερβαλλόντως κατεσκευάστο. 42, τούτου δ' ἐφεξῆς σχολαστήριον ὑπῆρχε πεντάκλινον, ἐκ πύξου τοὺς τοίχους καὶ τὰ θυρώματα κατεσκευασμένον, βιβλιοθήκην ἔχον ἐν αὐτῷ, κατὰ δὲ τὴν ὁροφὴν πόλον, ἐκ τοῦ κατὰ τὴν Ἀχραδίνην ἀπομεμνημένον ἡλιοτροπίου. ἦν δὲ καὶ βαλανεῖον τρίκλινον, πυρίας χαλκᾶς ἔχον τρεῖς καὶ λουτήρα πέντε μετρητὰς δεχόμενον, ποικίλον τοῦ Ταυρομενίτου λίθου. κατεσκευάστο δὲ καὶ οἰκήματα, κ.τ.λ. Athenæos ascribes this ship to Hieron, but the description seems to be inspired by ships of later date: see pp. 27—29. Suetonius, Caligula, 37, *fabricavit et de cedris Liburnicas gemmatas purpibus, versicoloribus velis, magna thermiarum et porticum et tricliniorum laxitate, magnaue etiam vitium et pomiferarum arborum varietate; quibus discumbens de die inter choros ac symphonias litora Campanie peragravit*. Maximus Tyrius, i. 3, λέγω δὲ οὐ μῦθον πλάττων, ἀλλὰ οὐ πολλὸς χρόνος ὅτε ἐξ Αἰγύπτου ἐς Τύρον ἔπειλε βασιλεὺς τῶν ὑπὲρ Φοινίκης βαρβάρων ἐκείνων τῶν ἀνδρῶν, οἱ “οὐκ ἴσασι θάλατταν, οὐδὲ ἀλέγουσι τοῦ Αἰγυπτίου Διὸς οὐδὲ θεῶν μακάρων.” παρσκευάσατο δὲ μέλλων πλεῖν ὁ ἄθεος οὗτος καὶ ἀθάλαττος βασιλεὺς μεγάλην καὶ εὐρύχωρον ναῦν, ἵνα αὐτῷ πᾶσαι αἱ ἡδοναὶ συμπλέωσι· τὸ μὲν γὰρ αὐτῆς βασιλεία ἦν οἷα κάλλιστα, παστοάδες, καὶ εὐναί, καὶ δρόμοι· “ἔκτοσθεν δ' αὐλῆς μέγας ὄρχατος ἀγχι θυρῶν τετράγυος,” καὶ δένδρα ἐμπεφύκεσαν, ῥοαί, καὶ ὄγγαι, καὶ μηλαί, καὶ ἀμπελοι· τὸ δὲ αὐτῆς λουτρὸν ἦν, καὶ γυμνάσιον· τὸ δὲ ὀψοποιοῦς χώρα· τὸ δὲ θάλαμοι παλλακίσαι· τὸ δὲ συμπόσιον· τὸ δὲ ἄλλο τι μέρος τρυφώσης πόλεως. This would naturally refer to some king of the Nabatæans; but in the context his name is given as Æetes, and that does not suit any king in history. Plutarch, Lucullus, 7, ἐτι δὲ ναὺς οὐ χρυσορόφοις σκηρίσις οὐδὲ λουτροῖς παλλακίδων καὶ γυναικωνίτισι τρυφώσαις ἡσκημένας, ἀλλ' ὅπλων καὶ βελῶν καὶ χρημάτων γεμούσας παραρτυμένους, sc. Μιθράδατης.

<sup>124</sup> Pliny, xxxii. 1, *sed armatæ classes imponunt sibi turrium propugnacula, ut in mari quoque pugnetur velut e muris*. Vegetius, iv. 44, *in maioribus etiam liburnis propugnacula turresque constituunt, ut tamquam de muro ita de excelsioribus tabulatis facilius vulnerent vel perimant inimicos*. Horace, epodes, i. 1, 2, *ibis liburnis inter alta navium, | amice, propugnacula*. The term *liburni* is used strictly by Horace, but loosely by Vegetius—see p. 16 and notes 42, 44—so their statements are not contradictory. Lucan, iv. 226, *turrigeras classis pelago sparsura carinas*, cf. iii. 514. Virgil, Æneid, viii. 693, *turritis purpibus*.

height<sup>125</sup>. A little turret is represented in the bows of the Roman war-ship of about 50 A.D. in fig. 25. On such ships the turrets were painted; and their colouring served to distinguish one squadron from another<sup>126</sup>.

To counterbalance these encumbrances upon the upper decking, quantities of ballast would be required at the bottom of the hold; and some gravel or sand or stone always was carried there for steadying the ship<sup>127</sup>. And this ballast could

<sup>125</sup> Thucydides, vii. 25, *προσαγαγόντες γὰρ ναὺν μυριοφόρον αὐτοῖς οἱ Ἀθηναῖοι, πύργους τε ξυλλέουσιν ἔχουσιν καὶ παραφράγματα, κ.τ.λ.* Appian, *de bellis civilibus*, v. 106, καὶ πύργους ἐπὶ τῶν νεῶν εἶχον κατὰ τε πρῶραν καὶ κατὰ πρύμναν. Athenæos, v. 43, πύργοι τε ἦσαν ἐν αὐτῇ ὀκτώ, σύμμετροι τὸ μέγεθος τοῖς τῆς νεῶς ὄγκοις· δύο μὲν κατὰ πρύμναν, οἱ δ' ἴσοι κατὰ πρῶραν, οἱ λοιποὶ δὲ κατὰ μέσσην ναῦν. cf. 42, ἀτλαντές τε περιέτρεχον τὴν ναῦν ἐκτὸς ἐξαπῆχεις, οἱ τοὺς ὄγκους ὑπελήφesan τοὺς ἀνωτάτω. These ὄγκοι are presumably the πυργοῦχοι of Polybios, xvi. 3, παραπесῶν δὲ τοῖς πολεμίοις, ἀπέβαλε τὸν δεξιὸν ταρσὸν τῆς νεῶς, ὁμοῦ συρράγόντων καὶ τῶν πυργοῦχων. Thus the ὄγκοι or πυργοῦχοι would be beams or platforms projecting from the ship, and serving as foundations for the 'turrets'. Dion Cassius, l. 33, οἱ μὲν τὰ ἱστία ἡγείρων, οἱ δὲ τοὺς τε πύργους καὶ τὰ ἐπιπλά εἰς τὴν θάλασσαν ἐρρίπτουν, ὅπως κουφίσαντες διαφύγωσι. Appian, *de bellis civilibus*, iv. 72, ἐλπίζων γὰρ τι τοιοῦτον, ἐπέφερετο (Κάσσιος) πύργους ἐπτυγμένους, οἱ τότε ἀνίστατο. Caesar, *de bello Gallico*, iii. 14, *turribus excitatis, de bello civili*, i. 26, *turres cum ternis tabulatis erigebat*. The reference is here to merchant-ships; and so also in the passages quoted above from Athenæos and Thucydides. Although the statements of Athenæos are questionable, since they are borrowed from Moschion—see pp. 27 to 29—they probably are based on fact.

<sup>126</sup> Appian, *de bellis civilibus*, v. 121, μόλις δὲ ποτε ταῖς χροαῖς τῶν πύργων, αἱς δὴ μόνοις διέφερον ἀλλήλων, ὁ Ἀγρίππας συνεὶς πλέονας ἀπολωλέναι τοῦ Πομπηίου ναὺς, ἐθάρρυνε τοὺς συνόντας, κ.τ.λ. See also Polyænos, v. 34, already quoted at the end of note 89 on p. 35, as to uniformity of colouring in a fleet.

<sup>127</sup> Odyssey, v. 257, πολλὴν δ' ἐπεχεύατο ὄλην. Lycophron, 618, τὸν ἐρμάτιττην νηὸς ἐκβαλὼν πέτρων. Plato, *Theætetos*, p. 144 A, καὶ ἄπτοντες φέρονται ὥσπερ τὰ ἀνερμάτιστα πλοῖα. Plutarch, *animi et corporis affectiones*, 4, ἀκυβέρνητος καὶ ἀνερμάτιστος εἰς τι νανάγιον φοβερόν ἐξέπεσε, *ad principem ineruditum*, 5, ἔρματος πολλοῦ καὶ κυβερνήτου μεγάλου δεόμενον. Livy, xxxvii. 14, *onerarias multa saburra gravatas*. Pliny, xvi. 76, *CXX M modiorum lentis pro saburra ei fuere*. See also Aristotle, *historia animalium*, viii. 12. 5, ix. 40. 21; Pliny, x. 30, xviii. 87; Aristophanes, *aves*, 1428, 1429; Virgil, *georgics*, iv. 194—196; Plutarch, *de solertia animalium*, 10. 10, 28. 2. At Portus, near the mouth of the Tiber, the ballast-heavers formed a guild, *corpus saburrariorum*: Corp. Inscr. Latin. vol. xiv, no. 102.

<sup>128</sup> Arrian, *anabasis*, ii. 19, ἔρματά τε εἰς τὴν πρύμναν ἐνέθεσαν, τοῦ ἐξᾶραι ἐς ὕψος τὴν πρῶραν πιεζομένης κατὰ πρύμναν τῆς νεῶς. Polybios, xvi. 4, αὐτοὶ μὲν γὰρ ἐμπύρρα τὰ σκάφη ποιοῦντες, ἐξάλους ἐλάμβανον τὰς πληγὰς· τοῖς δὲ πολεμίοις ὕφαλα τὰ τραύματα διδόντες, ἀποθηήτους ἐσκεύαζον τὰς πληγὰς.

easily be shifted fore or aft to depress or elevate the bows, as need arose for ramming or manœuvring<sup>138</sup>. At the bottom of the hold there was also a mass of bilge-water, which needed constant baling out by buckets or else by a machine consisting of an Archimedean screw worked by some sort of treadmill<sup>139</sup>. And probably the cisterns for the drinking-water were also down below, serving like the bilge to increase the weight of ballast<sup>140</sup>.

<sup>138</sup> *Odyssey*, xii. 410, 411, ἰστὸς δ' ὅπισω πέσεν, ὅπλα τε πάντα | εἰς ἄντλον κατέκυντο. xv. 479, ἄντλῳ δ' ἐνδοῦπηρε πεσοῦσ', ὥς εἰσάλλῃ κῆρ. *Sophocles*, *Philoctetes*, 481, 482, ἐμβαλοῦ μ' ὅπη θέλεις ἄγων, | εἰς ἄντλιν, ἐς πρῶραν, ἐς πρύμνην. *Cicero*, *ad familiares*, ix. 15. 3, *sedebamus enim in ruppri et clauum tenebamus: nunc autem vix est in sentina locus*. *Sallust*, *Catilina*, 37, *Romam, sicut in sentinam, confluerant*. These terms ἄντλος or ἄντλια and *sentina*, which thus denoted the bilge of a ship, also denoted the bilge-water. *Æschylos*, *septem adversus Thebas*, 795, 796, καὶ κλυδωνίου | πολλαῖσι πληγαῖς ἄντλον οὐκ ἐδέξατο. *Seneca*, *epistolæ*, 30, *quemadmodum in nave, quæ sentinam trahit, uni rimæ aut alteri obsistitur, ubi plurimis locis laxari cæpit et cedere, succurri non potest navigio dehiscenti*. *Euripides*, *Troades*, 685, 686, ὁ μὲν παρ' ὀλαχ', ὁ δ' ἐπὶ λαίφεσιν βεβῶς, | ὁ δ' ἄντλον εἰργων ναός. *Cicero*, *de senectute*, 6, *alii malos scandant, alii per foros cursant, alii sentinam exhaustant*. The buckets for the baling were known as ἄντλητήρια or *sentinacula*. *Dion Cassius*, l. 34, ὅτε γὰρ πολλὰ ἦ καὶ μεγάλη τὰ ἄντλητήρια εἶχον, καὶ ἡμιδεῖα αὐτὰ ἄτε ταραττόμενοι ἀνέφερον. *Paulinus Nolanus*, *epistolæ*, 49. 3, *et post unum vel alterum brevis sentinaculi haustum humore distracto siccatæque navi, etc.* The pump is mentioned by *Athenæos*, v. 43, ἡ δὲ ἄντλια, καίπερ βάθος ὑπερβάλλον ἔχουσα, δι' ἐνὸς ἀνδρὸς ἐξηγτλείτο διὰ κοχλίου, Ἀρχιμήδους ἐξευρόντος. cf. *Vitruvius*, x. 6. 3, *cochlea hominibus calcantibus facit versationes*. *Artemidoros*, *oneirocritica*, i. 48, οἷδα δὲ τινα, ὅς ἐδοξε τοῦ παντὸς σώματος ἀτρέμα μένοντος τοὺς πόδας αὐτοῦ μόνους βαδίζειν, καὶ προβαίνειν μὲν μηδὲ βραχὺ, ὅμως δὲ κινεῖσθαι. συνέβη αὐτῷ εἰς ἄντλιαν καταδικασθῆναι. καὶ γὰρ ἐκεῖ τοῖς ἄντλοισι συμβέβηκε διαβαίνειν μὲν ὡς βαδίζουσιν, αἰεὶ δὲ μένειν ἐν τῷ αὐτῷ τόπῳ. For the phrase εἰς ἄντλιαν καταδικασθῆναι, cf. *Suetonius*, *Tiberius*, 51, *in antliam condemnato*. In the context *Artemidoros* says that a man was set to bale ὅντι πανούργῳ, and *Lucian* reckons it fit work for the ἀργὸν καὶ ἄτεχνον καὶ ἄτολμον, *Jupiter tragoedus*, 48. See also *Paulinus Nolanus*, *epistolæ*, 49. 12, *seni persona sentinatoris, et in nautis vilissima*.

<sup>140</sup> *Lucian*, *veræ historię*, i. 5, πᾶμπολλα μὲν σιτία ἐνεβαλόμην, ἱκανὸν δὲ καὶ ὕδωρ ἐνεθέμην, κ.τ.λ. ii. 1, τὴν αὐτὴν ἐπεσκευάζομεν, ὕδωρ τε ὅς ἐνι πλείστον ἐμβαλλόμενοι καὶ τὰ ἄλλα ἐπιτήδεα. *Dion Cassius*, l. 34, τὸ μὲν πρῶτον τῷ ποτίμῳ ὕδατι ᾧ ἐπεφέροντο ἐχρῶντο, καὶ τινα κατέσβεσαν· ἐπεὶ δὲ ἐκείνο καταναλώθη, ἦντλον τὸ θαλάττιον. *Athenæos*, v. 42, ἦν δὲ καὶ ὕδροθήκη κατὰ τὴν πρῶραν κλειστή, δισχιλίους μετρητὰς δεχομένη, ἐκ σανίδων καὶ πίττης καὶ ὀθνίων κατασκευασμένη. As a μετρητὴς was equivalent to a cubic foot and a half, this cistern would contain 3000 cubic feet of water; and that would weigh about 75 tons. The statement is open to suspicion as it comes from *Moschion*: see pp. 27—29.



In the fore part of the war-ships everything was constructed with a view to ramming. The catheads were massive, and stood out far enough to tear away the upper works of a hostile ship, while the ram was piercing her below; for which purpose they occasionally were strengthened at the ends by timbers springing from the hull some way behind<sup>141</sup>. And they must also have served in ramming to protect the oars from damage by the enemy. Their position and design may be observed in the Greek war-ships of about 300 B.C. in figs. 22 and 23. Here the catheads are on a level with the gunwale and the gangway, which both finish at this point, while the waling-pieces run onward to the stem. Right forward the keel and stem-post and the lower pair of waling-pieces converge to hold the ram; and higher up the stem-

<sup>141</sup> Thucydides, vii. 34, τῶν δ' Ἀθηναίων κατέδυν μὲν οὐδεμία ἀπλῶς, ἐπὶ δέ τινες ἀπλοὶ ἐγένοντο ἀντίπρῳροι ἐμβαλλόμενοι καὶ ἀναβραγαίσαι τὰς παρεξαιρεσίας ὑπὸ τῶν Κορινθίων νεῶν ἐπ' αὐτὸ τοῦτο παχυτέρας τὰς ἐπωτίδας ἔχουσῶν. 36, καὶ τὰς πρῶρας τῶν νεῶν ξυνημένους (οἱ Συρακόσιοι) ἐς ἑλασσον στεριφωτέρας ἐποίησαν, καὶ τὰς ἐπωτίδας ἐπέθεσαν ταῖς πρῶραις παχέας, καὶ ἀντήριδας ἀπ' αὐτῶν ὑπέτειναν πρὸς τοὺς τοίχους ὥς ἐπὶ ἑξήκεις ἐντός τε καὶ ἔξωθεν, ὥπερ τρῶπυ καὶ οἱ Κορίνθιοι πρὸς τὰς ἐν τῇ Ναυπάκτῳ ναὺς ἐπισκευασάμενοι πρῶραθεν ἐναυμάχουν. 40, οἱ δὲ Συρακόσιοι δεξάμενοι καὶ ταῖς τε ναυσὶν ἀντιπρῶροις χρώμενοι, ὥσπερ διενσήθησαν, τῶν ἐμβόλων τῇ παρασκευῇ ἀνεβήγγυνσαν τὰς τῶν Ἀθηναίων ναὺς ἐπὶ πολὺ τῆς παρεξαιρεσίας, κ.τ.λ. cf. 36, ἀντίπρῳροι γὰρ (ἐνόμισαν) ταῖς ἐμβολαῖς χρώμενοι ἀναρρήξιν τὰ πρῶραθεν αὐτοῖς. In these passages the term *παρεξαιρεσία* denotes the bows; but its meaning is merely that the place was out beyond the oars, and sometimes it denotes the quarters or the stern, as in the passages quoted from Polyænos in note 170 on p. 75 and from Thucydides and Plutarch in note 223 on p. 102. In saying that the bows were made shorter, Thucydides may only mean that the distance between the ram and the catheads was reduced by carrying the catheads further forward. Diodoros says that the bows were also made lower, xiii. 10, but that was merely a matter of ballasting: see note 138 on p. 60. The *ἀντήριδες* were clearly a pair of props sloping upwards and forwards from some point in the keel to the extremities of the catheads, and thus passing through the ship's sides a little ahead of the oars of the lower banks. The term *ἀντήριδες* is employed by Polybios to denote the props for a gangway, viii. 6. 6. Dion Cassius, xlix. 3, καὶ τοῖς μὲν τὸ τε ὕψος τῶν σκαφῶν καὶ τὸ πᾶχος τῶν ἐπωτίδων ὅ τε πύργοι συνηήροντο, τοὺς δ' ἐτέρους ὅ τε διέκπλοι ἀνέφερον, κ.τ.λ. This refers to the action off Mylæ in 36 B.C. between the fleets of Augustus Cæsar and Sextus Pompeius. As a rule, the *ἐπωτίδες* had a backing of the strongest timber. Theophrastos, *historia plantarum*, v. 7. 3, τὸ δὲ στερέωμα, πρὸς ᾧ τὸ χέλυσμα καὶ τὰς ἐπωτίδας, μέλας καὶ συκαμῖνον καὶ πτελέας· ἰσχυρὰ γὰρ δεῖ ταῦτ' εἶναι. For the use of the *ἐπωτίδες* as catheads for the anchors, see note 154 on p. 69.

post a smaller ram is fixed upon the junction of the upper pair of waling-pieces. In ships of more than three banks there was presumably an extra ram for every extra pair of waling-pieces; and here some rams are fixed upon false waling-pieces on a level with the catheads<sup>148</sup>. All these auxiliary rams would extend the wound inflicted by the principal ram, and thus cut an enemy open from the gunwale to the water-line; while they would also protect the stem-post underneath them from being shattered by contact with her sides.

The rams usually were made of bronze<sup>149</sup>. On the Athenian three-banked ships the principal ram did not weigh more than three talents or thereabouts, that is to say, 170 lbs.; so the metal could only have formed a sheathing round a

<sup>148</sup> Athenæos, v. 37, καὶ ἔμβολα εἶχεν ἑπτὰ· τούτων ἐν μὲν ἡγούμενον, τὰ δ' ὑποστέλλοντα· τινὰ δὲ κατὰ τὰς ἐπωτίδας. This refers to the alleged ship of forty banks. Apparently, the meaning of the last words is that she had some auxiliary rams on a level with the catheads in addition to the other six. Æschylos applied the epithet *δεκέμβολος* to Nestor's ship in the 'Myrmidons', according to the scholiast on Aristophanes, *aves*, 1256, οὕτω γέρων ὦν στύομαι τριέμβολον. cf. Fr. 301, apud Athenæum, i. 52, ἐπεγερεῖ τὸν ἔμβολον. But clearly the meaning was that a good ship could go on ramming time after time; not that ten rams were carried, or even three. Corp. Inscr. Attic. vol. ii, no. 795, col. d, ll. 3—7, Νικηφόρος, Θεοδώρου ἔργον, ἐπισκευῆς δεομένη, προεμβόλιον οὐκ ἔχουσα, cf. col. e, ll. 28—32, no. 796, col. a, ll. 38—41, col. e, ll. 4—7. These entries refer to ships of three banks; and indicate that such ships had only one *προεμβόλιον*, or auxiliary *ἔμβολος*.

<sup>149</sup> Æschylos, *Persæ*, 408, 409, ναὺς ἐν νηὶ χαλκῇ στόλον | ἔπαισεν, 415, 416, ἔμβολαῖς χαλκοστόμοις | παλοντο. Plutarch, Antonius, 67, πλὴν οὐκ ἐπέβαλεν εἰς τὴν Ἀντωνίου ναῦν, ἀλλὰ τὴν ἐτέραν τῶν ναυαρχίδων τῷ χαλκώματι πατάξας περιεβόμβησε, Sulla, 22, ναὺς χαλκῆρεϊς, Pompeius, 28, ναὺς χαλκεμβόλους. cf. Euripides, *Iphigenia in Aulide*, 1319, ναῶν χαλκεμβολάδων, *Electra*, 436, πρῶραις κυανεμβόλοισιν. Philippos, in the *Anthology*, vi. 236, ἔμβολα χαλκογένεα, φιλόπλοα τεύχεα νηῶν. Petronius, *satiræ*, 30, *embolus navis æneum*. Statius, *Thebais*, v. 335, *arata dispellens æquora prora*. Virgil, *Æneid*, i. 35, *spumas salis ære ruent, viii. 675, classes aratas*. Cæsar, de bello civili, ii. 3, *cum classe navium sexdecim, in quibus pauca erant arata*. Horace, *odes*, ii. 16. 21, 22, *scandit aratas vitiosa naves | cura*, iii. 1. 39, *decedit arata triremi*. Iron is mentioned by Pliny, xxxii. 1, *rostra illa, ære ferroque ad ictus armata*, and by Vitruvius, x. 15. 6, *is autem aries habuerat de ferro duro rostrum, ita uti naves longæ solent habere*. But see Tibullus, iv. 1. 173, *ferro tellus, pontus conscinditur ære*. Corp. Inscr. Attic. vol. ii, no. 789 b, ll. 27, 32, 89, 90, τὸ χάλκωμα τὸ ἀνω. This was presumably the *προεμβόλιον*.

core of timber<sup>144</sup>. And thus the ram was often a treacherous weapon in warfare, inasmuch as it was slender enough to be wrenched off the ship in delivering its blow, and started her timbers as it broke away<sup>145</sup>. As a rule, it had three teeth; so that it looked like a trident, when viewed from the side<sup>146</sup>. These teeth are conspicuous in the Greek ship of about 300 B.C. in fig. 23; but in the Greek ship of about 600 B.C. in fig. 13, and also in the Phœnician ship of about 700 B.C. in fig. 10, the ram has only a single tooth: and here the ram curves slightly upward, whereas the trident ram curves down, as though it was intended to heel an enemy over. This downward curve appears again in one of the Greek ships of about 550 B.C. in figs. 15 and 16, while the curve points upward in the other; so both the forms were then in use concurrently. And apparently the earlier form was developing the curious type depicted in the Athenian ships of

<sup>144</sup> Corp. Inscr. Attic. vol. ii, no. 809, col. e, ll. 169—172, [ἐμβολοι] τ[έ]τ[τα]ρες, σταθμ[όν] ΤΤΤ μναὶ Δ[Δ]ΔΠ, τιμή ΠΔΔΤΤΤ....cf. no. 811, col. c, l. 87, [ἐμ]βόλους Π, σταθμὸν....l. 88, ΔΔΔΠ, τιμή.... These are entries of delivery and receipt, and ought therefore to correspond. The word τέτταρες has been defaced by the mason; so it was inserted by mistake, the number really being five. There probably were other figures in the gap between σταθμ and ΤΤΤ, perhaps ΔΤ, or even ΔΠ, for the price is a trifle under 525 drachms, and this would represent about fifteen talents of metal for the five rams, as bronze was selling for 35 drachms a talent at that period: see Corp. Inscr. Attic. vol. i, no. 319, ll. 2—4, χαλκὸς ἐωνήθη...τάλαντα...καὶ δεκα καὶ μναὶ δέκ[α]. τι[μ]ή [τοῦ] ταλάντου τριάκοντα πέντε δραχμαί. These restorations are considerable; but they are justified by what follows. cf. ll. 5—8, καττίτερος ἐωνήθη...τὸ τάλαντον διακοσίων τριάκοντα δραχμῶν τιμή.

<sup>145</sup> Herodotos, i. 166, αἱ μὲν γὰρ τεσσαράκοντά σφισι νέες διεφθάρσαν, αἱ δὲ ἑκοσίαι περιεοῦσαι ἔσαν ἄχρηστοι· ἀπεστράφατο γὰρ τοὺς ἐμβόλους. Dion Cassius, xlix. 1, πρὸς τε τὰς ἐμβολὰς τῶν ἐναντίων ἀντέχειν, καὶ τοὺς ἐμβόλους αὐτῶν ἀποστρέφειν. Plutarch, Antonius, 66, ἀπεθραύοντο γὰρ τὰ ἐμβολα ῥαδίως. Polybios, xvi. 5, ταύτης γὰρ (ἣν ἐκυβέρα Αὐτόλυκος) ἐμβαλοῦσης εἰς πολεμίαν ναῦν, καὶ καταλιπούσης ἐν τῷ σκάφει τὸν ἐμβολον, συνέβη δὴ, τὴν μὲν πληγείσαν αὐτανδρον καταδύναι, τοὺς δὲ περὶ τὸν Αὐτόλυκον, εἰσρεούσης εἰς τὴν ναῦν τῆς θαλάσσης διὰ τῆς πύρας, κ.τ.λ....τὴν μὲν ναῦν οὐκ ἠδυνήθη σῶσαι, διὰ τὸ πλήρη θαλάττης εἶναι, κ.τ.λ. Aulus Hirtius, de bello Alexandrino, 46, itaque primus (Vatinius) sua quinqueremi in quadriveremem ipsius Octavi impetum fecit. celerrime fortissimeque contra illo remigante, naues adversa rostris concurrerunt adeo vehementer ut navis Octaviana, rostro discusso, ligno contineretur...deprimiur ipsius Octavi quadriveremis. cf. Caesar, de bello civili, ii. 6, præfracto rostro.

about 500 B.C. in figs. 17 and 19, where the ram assumes the shape of a boar's head. This type was characteristic of Samian ships in the days of Polycrates<sup>147</sup>, who ruled there from 532 to 522 B.C.; but it afterwards came into use on ships of other states. And in later times, when the principal ram was usually a trident, the boar's head was retained for a smaller ram above, as in the Leucadian ship of about 150 B.C. in fig. 42. Some of these smaller heads are extant; and one of them is drawn to scale in fig. 43. They probably belonged to Roman ships.

Before the introduction of the ram, animals had been carved upon the prow for figure-heads, as in the Egyptian war-ship of about 1000 B.C. in fig. 6. And generally there was either a figure-head, or else a painting or relief on both the bows; the subject corresponding to the name of the ship, and serving to distinguish her from others<sup>148</sup>. Such paintings

<sup>146</sup> Virgil, *Æneid*, v. 142, 143, *infindunt pariter sulcos, totumque dehiscit | convulsam remis rostrisque tridentibus aquor*, cf. viii. 689, 690. Valerius Flaccus, i. 687, 688, *volat immissis cava pinus habenis | infinditque salum, et spumas vomit ære tridenti*.

<sup>147</sup> Herodotus, iii. 59, ἔκτω δὲ ἔρει Αἰγινῆται αὐτοὺς (Σαμίους) ναυμαχίῃ νικήσαντες ἠδραποδίσαντο μετὰ Κρητῶν, καὶ τῶν νεῶν καπρίους ἐχουσέων τὰς πρῶρας ἡκρωτηρίασαν καὶ ἀνέθεσαν ἐς τὸ ἶρὸν τῆς Ἀθηναίης ἐν Αἰγίνῃ. Anonymus, apud Hesychium, s. v. Σαμακὸς τρόπος:—ναὺς δὲ τις ὠκύπορος Σαμία ὑὸς εἶδος ἔχουσα. Plutarch, Pericles, 26, ἡ δὲ Σάμαινα ναὺς ἐστὶν ὑπόπτερος μὲν τὸ σίμωμα, κοιλοτέρα δὲ καὶ γαστροειδής, ὥστε καὶ φορτοφορεῖν καὶ ταχυναυτεῖν. οὕτω δ' ὠνομάσθη διὰ τὸ πρῶτον ἐν Σάμῃ φανῆναι, Πολυκράτους τυράννου κατασκευάσαντος. cf. Alexis Samios, apud Athenæum, xii. 57, πρῶτος δὲ ὁ Πολυκράτης καὶ ναὺς πῆξας ἀπὸ τῆς πατρίδος Σαμίας ἐκάλεσε. For σίμωμα, cf. Thucydides, iv. 25, ἀποσιμωσάντων καὶ προεμβαλόντων, Appian, de bellis civilibus, iv. 71, ἐμβολαὶ καὶ ἀποσιμώσεις, Aristotle, *problemata*, xxiii. 5, ἀνάσιμα τὰ πλοῖα ποιοῦνται. Thus the stem was styled the nose, just as the bows were styled the cheeks and the hawse-holes the eyes: see note 91 on p. 37 and note 153 on p. 69.

<sup>148</sup> Diodorus, iv. 47, διαπλεῦσαι γὰρ αὐτὸν (Φρίξον) φασὶν οἱ μὲν ἐπὶ νεῷς προτομήν ἐπὶ τῆς πρῶρας ἐχούσης κριοῦ, κ.τ.λ. Apollodoros, Fr. 105, apud Stephanum, s. v. Ταυροῖς:—ταυροφόρος ἦν ἡ ναὺς ἡ διακομίσασα τοὺς τὴν πόλιν κτίσαντας, ἀπὸ τοῦ ἐπιστήμου τῆς νεῷς τὴν πόλιν ὠνόμασαν. A λεοντοφόρος is mentioned in the passage quoted from Memnon in note 35 on p. 14. Plutarch, de mulierum virtutibus, 9, ἔπλει δὲ (Χίμαρρος) πλοῖφ λέοντα μὲν ἔχοντι πρῶραθεν ἐπίσημον, ἐκ δὲ πρύμνης δράκοντα. Strabo, ii. 3. 4, εὐρόντα δ' ἀκρόπτερον ξύλινον ἐκ ναυαγίου, ἵππον ἔχον ἐγγεγλυμμένον, δεικνύναι τοῖς ναυκλήροις, γινῶναι δὲ Γαδεριτῶν δν' τούτων γὰρ τοὺς μὲν ἐμπόρους μεγάλα στέλλειν πλοῖα, τοὺς δὲ πένητας μικρά, ἃ καλεῖν ἵππους ἀπὸ τῶν ἐν ταῖς πρῶραις ἐπισήμων. Hippocrates, *epistolæ*, 17, ἐξέπεμψας δέ μοι, φιλότῃς,

or reliefs may be seen upon the Roman ships of about 200 A.D. in figs. 29 and 31, and a figure-head upon the Roman ship of about 50 A.D. in fig. 26. The only figure-head now extant is drawn to scale in fig. 41. This was found off Actium, and probably dates from the time of the battle. On ships of that period it was customary to add some carved or painted figures as supporters; so that if a ship were called the *Ida* and had a personification of the mountain on her prow, she would have a pair of Phrygian lions down below, as in the Roman war-ship of about 50 A.D. in fig. 25, where the crocodiles indicate that the ship was called the *Nile*<sup>149</sup>. All these figures on the stem were intended to distinguish ship from ship, and had nothing to do with the statues of the

ὡς ἀληθέως Ἀσκληπιάδα νῆα, ἥ πρόσθε μετὰ τοῦ Ἄλλου ἐπίσημον καὶ Ὑγιείην. But while animals would be suitable for figure-heads, this group of *Helios* and *Hygieia* suggests a relief or painting on the bows: cf. *Lucian, navigium*, 5, τὴν ἐπὶ ὠνυμον τῆς νεὸς θεὸν ἔχουσα τὴν Ἰσιν ἐκατέρωθεν, sc. ἡ πρῶρα. Strictly a figure-head would be an ἐπίσημον, while such a painting or relief would be a παράσημον. *Acts*, xxviii. 11, ἐν πλοίῳ Ἀλεξανδρινῷ, παρασήμῳ Διοσκούροις. *Plutarch, Themistocles*, 15, πρῶτος μὲν οὖν λαμβάνει ναὺν Δυκομήδης, ἀνὴρ Ἀθηναῖος, τριηραρχῶν, ἥς τὰ παράσημα περικύβας ἀνέθηκεν Ἀπόλλωνι δαφνηφόρῳ, the plural indicating that the παράσημον was repeated on each bow of the ship. *Plutarch, septem sapientium convivium*, 18, πυθόμενον τοῦ τε ναυκλήρου τοῦνομα καὶ τοῦ κυβερνήτου καὶ τῆς νεὸς τὸ παράσημον. cf. *Herodotos*, viii. 88, σαφέως τὸ ἐπίσημον τῆς νεὸς ἐπισταμένους. Thus the terms παράσημον and ἐπίσημον were used indifferently to denote the badges which distinguished one ship from another. But where *Diodoros* says τοῖς ἐπὶ ταῖς πρῶραις ἐπισήμασι, xiii. 3, *Thucydides* merely says σημείοις, vi. 31; and the wider term is approved by *Aristophanes*, *ranæ*, 932, Διδύμοις:—τὸν ξουθὸν ἱππαλεκτρύονα ζητῶν, τίς ἐστὶν ὄρνις. 933, Ἀσχύλος:—σημείων ἐν ταῖς ναυσὶν, ὠμαθέστατ', ἐνεγέγραπτο. The term *insigne* was employed in Latin. *Tacitus, annales*, vi. 34, *navis insigne fuit*, sc. *aries*. *Propertius*, iv. 6. 49, *vehunt prore Centauros saxa minantes*. *Virgil, Æneid*, x. 195—197, *ingeniem remis Centaurum promovet: ille | instat aquæ, saxumque undis immane minatur | arduus, et longa sulcat maria alta carina*, cf. 156—158, 209—212. *Silius Italicus* enumerates a whole fleet of ships and their badges, xiv. 567 ff.—*Europa* on the bull, a *Nereid* on a dolphin, *Pegasus*, a *Siren*, a *Triton*, sundry deities, mount *Etna* personified, and so also *Sidon*, *Libya*, etc.

<sup>149</sup> *Virgil, Æneid*, x. 156—158, *Æneia puppis | prima tenet, rostro Phrygios subiuncta leones: | imminet Ida super, profugis gratissima Teucris*. Inscription in the *Bulletin épigraphique de la Gaule*, vol. ii, p. 139, *Ti(berio) Claudio, Aug(usti) lib(erto), Eroti, trierarcho liburnæ Nili*. This must date from the middle of the First Century, the deceased being a freedman of *Claudius* or *Nero*; so the Roman fleet contained a two-banked ship called the *Nile* about the time when the two-banked ship with the crocodiles was being carved in that relief.

gods by which the ships belonging to one state were distinguished from the ships belonging to another; every Athenian ship carrying a statue of Pallas Athene, every Carthaginian ship a statue of Ammon, and so forth. On the Roman ship of about 200 A.D. in fig. 29 one of these statues may perhaps be seen at the far end of the stern, which was the usual place for them<sup>150</sup>. The stern here is prolonged into a kind of gallery, while its true contour is marked by the swan's neck that rises in a curve within; and in the Roman ship of about 50 A.D. in fig. 26 the structure is the same, the swan or goose being a recognized feature in ships of that period<sup>151</sup>. Very often the goose was gilded; and so also were the statues of the gods.

<sup>150</sup> Euripides, *Iphigenia in Aulide*, 239—241, χρυσέαις δ' εἰκόσιν | κατ' ἄκρα Νηρῆδες ἔστασαν θεῶν | πρύμναις, σῆμ' Ἀχιλλεῖον στρατοῦ, 246—258, Ἀθλίδος δ' ἄγων | ἐξήκοντα ναὺς ὁ Θησέως | παῖς ἐξῆς ἐναυλόχει, θεῶν | Παλλὰδ' ἐν μωνύχοις | ἔχων πτερωτοῖσιν ἄρμασιν θετόν, | εὐσημόν γε φάσμα ναυβάταις. | τῶν Βοιωτῶν δ' ὄπλισμα, ποντίας | πεντήκοντα νῆας εἰδόμαν | σημείοισιν ἐστολισμέναις· | τοῖς δὲ Κάδμος ἦν | χρύσειον δράκοντ' ἔχων | ἀμφὶ ναῶν κόρυμβα. 273—276, ἐκ Πύλου δὲ Νέστορος | Γερηνίου κατειδόμεν | πρύμνας σῆμα ταυρόπουν δρᾶν | τὸν πάροικον Ἀλφειόν. Aristophanes, *Acharnenses*, 544—547, καὶ κάρτα μεντᾶν εὐθέως καθεῖλκετε | τριακοσίας ναὺς, ἦν δ' ἂν ἡ πόλις πλέα | θορύβου στρατιωτῶν, περὶ τριηράρχου βοῆς, | μισθοῦ διδομένου, Παλλαδίων χρυσομένων, κ.τ.λ. Virgil, *Æneid*, x. 170, 171, *una totius Abas: huic totum insignibus armis | agmen, et aurato fulgebat Apolline purpulis*. Silius Italicus, xiv. 408—410, *irrupit Cumana ratis, ... numen erat celsæ purpulis vicina Dione*, 438, 439, *Ammon numen erat Libyca gentile carinae, | cornigeraque sedens spectabat cœrula fronte*. Ovid, *tristia*, i. 10. 12, *Palladio numine tuta fuit, sc. navis*, cf. i. *flavæ tutela Minervæ*. Valerius Flaccus, viii. 202, 203, *purpæ procul summa vigilis post terga magistri | hæserat aurata genibus Medea Minervæ*, cf. i. 301, *fulgens tutela carinæ*. Seneca, *epistolæ*, 76. 13, *tutela (navis) ebore calata est*. The distinction between the *tutela* and the *insigne* is obvious in Ovid, *tristia*, i. 10. 1, 2, *est mihi, sitque precor, flavæ tutela Minervæ | navis, et a picta casside nomen habet*. There is presumably an error, πρῆρησι for πρύμναις, in the current reading of Herodotos, iii. 37, ἔστι γὰρ τοῦ Ἡφαιστοῦ τῶγαλμα τοῖσι Φοινικηλοῖσι Παταικοῖσι ἐμπερέστατον, τοὺς οἱ Φοίνικες ἐν τῇσι πρῆρησι τῶν τριηρέων περιάγουσι. οὗ δὲ τούτους μὴ ὅπωπε, ἐγὼ δὲ οἱ σιμάνειν· πυγμαλίου ἀνδρὸς μίμησις ἔστι.

<sup>151</sup> Lucian, *navigium*, 5, ἡ πρύμνα μὲν ἐπ' ἀνέστηκεν ἡρέμα καμπύλῃ χρυσοῦν χηνίσκον ἐπικειμένην, cf. *Jupiter tragoedus*, 47, quoted in note 158 on p. 71. Apuleius, *metamorphoses*, xi. 16, *purpulis intortia chenisco bracteis aureis vestito fulgebat*. Lucian, *veræ historię*, ii. 41, ὁ τε γὰρ ἐν τῇ πρύμνῃ χηνίσκος ἀφ' ὧν ἐπετερεύετο καὶ ἀνεβόησε, καὶ ὁ κυβερνήτης φαλακρὸς ἤδη ὧν ἀνεκώμησε, κ.τ.λ. This passage is obviously a skit on the Homeric hymn to Dionysos. The χηνίσκος is mentioned again by Ptolemy, *Almagest*, viii. 1, Ἀργοῦς ἀστερισμός.

The stern used generally to be surmounted by an ornament, which may originally have been an imitation of the bud or flower of the lotos, as in the Egyptian ships of about 1250 B.C. in figs. 3 to 5; but this developed into something like a plume or fan, that always looks rather massive in reliefs, as in fig. 24, but light and feathery in paintings, as in figs. 17 to 19, 35 and 36. This ornament was taken as a trophy, whenever a ship was captured<sup>159</sup>. Another such ornament used sometimes to surmount the stem in default of a figure-head, as in the Greek and Roman war-ships in figs. 23 and 25. The type depicted in fig. 23 and previously in fig. 13 can be traced to its origin in fig. 3, an old Egyptian form of bow surviving in this useless ornament above the ram. And the type

<sup>159</sup> Iliad, ix. 241, 242, στεῦται γὰρ νηῶν ἀποκόψει ἄκρα κόρυμβα, | αὐτὰς τ' ἐμπρήσειν μαλεροῦ πυρός. Apollonios Rhodios, ii. 601, ἔμπης δ' ἀφλάστοιο παρέθρισαν ἄκρα κόρυμβα = Valerius Flaccus, iv. 691, *extremis tamen increpue corymbis*. Here the κόρυμβα must be the aftermost piece of the ship, as the legend was that the Symplegades did not snap at the Argo till she was all but clear of them; and they are reckoned as part of the ἀφλαστον, which was certainly at the stern. Iliad, xv. 716, 717, Ἐκτωρ δὲ πρύμνηθεν ἐπεὶ λάβεν, οὐχὶ μελiei, | ἀφλαστον μετὰ χερσὶν ἔχων, cf. Lucan, iii. 586, *Graiumque audax aplustre retentat*. Lucretius, iv. 437, 438, *at maris ignaris in portu clauda videntur | navigia aplustris fractis obnitier undæ*. This shews that the *aplustre* reached down below the water-line, for Lucretius is speaking of the refraction through the water; so the *aplustre* or ἀφλαστον was presumably the after part of the keel, answering to the στείρα at the other end, as to which see note 96 on p. 40. But in Juvenal, x. 135, 136, *victæque triremis | aplustre*, the name *aplustre* seems to be transferred from the ἀφλαστον as a whole to the part that formed the trophy, the ἄκρα κόρυμβα. Many authors speak of ἀκροστόλια as trophies: Diodoros, xviii. 75, xx. 87; Strabo, iii. 4. 3; Plutarch, Alcibiades, 32; Appian, de bello Mithridatico, 25; Polyænos, iv. 6. 9. But authors of earlier date, and others who quote from them, prefer the term ἀκρωτήρια: Herodotos, iii. 59, viii. 121; Xenophon, Hellenica, ii. 3. 8, vi. 2. 36; Polyænos, v. 41; Athenæos, xii. 49. In the former passage Herodotos refers to ἀκρωτήρια at the bows—see note 147 on p. 65—but in the latter he describes a statue holding an ἀκρωτήριον in its hand; and when such figures appear on coins, the trophy in their hands is always the ornament from the stern. cf. Hymnus in Dioscuros, 10, 11, ἐπ' ἀκρωτήρια βάντες | πρύμνης. Again, in the passage quoted from Athenæos in note 24 on p. 9, Callixenos assigns the ἀκροστόλιον to the bows, contrasting it with the ἀφλαστον or ἀφλαστα at the stern; while in the Almagest, viii. 1, Ἀργοῦς ἀστερισμός, Ptolemy places a pair of stars ἐν τῷ ἀκροστολίῳ, and the constellation shewed only the after part of the ship. Thus ἀκρωτήριον and ἀκροστόλιον appear to be general terms for ornaments at either extremity of a ship, though oftenest applied to the ornament at the stern, as that was the more conspicuous. There is no warrant for the notion that the stem-post was called the

depicted in fig. 25 preserves the normal contour of the bow in merchant-ships. On the Roman merchant-ship in fig. 26 there is a gallery round the stem as well as round the stern; and both these galleries appear again in the ships of later date in figs. 37 and 40.

On each bow of a ship there generally was a huge eye, as in figs. 12, 13, 15, 19 and 40; and sometimes more than one, as in fig. 23. These pairs of eyes doubtless owed their origin to the sentiment that a ship is a living thing and must see her way: but in course of time they probably were turned to account as hawse-holes for the anchor-cables<sup>153</sup>. The anchors used to be suspended from the catheads a little way abaft of these hawse-holes<sup>154</sup>.

στόλος, and that the ἀκροστόλιον was the top of this; for in Æschylos, Persæ, 408, 409, εὐθὺς δὲ ναὺς ἐν νηὶ χαλκῆρῃ στόλον | ἐπαισεν, the term στόλος can hardly mean more than *structure*—cf. 416, ἔθρανον πάντα κωπήρῃ στόλον—and in Euripides, Iphigenia in Tauris, 1135, the meaning seems to be just as vague: see note 202 on p. 94. All these terms are avoided by Pausanias, v. 11. 5, καὶ Σαλαμὶς ἔχουσα ἐν τῇ χειρὶ τὸν ἐπὶ ταῖς ναυσὶν ἀκραὶς ποιοῦμενον κόσμον, x. 11. 6, ἀνάκειται δὲ καὶ πλοίων τὰ ἀκρα κοσμήματα.

<sup>153</sup> Æschylos, supplices, 716, καὶ πρῶρα πρόσθεν ὀμμασι βλέπουσ' ὁδόν, 743, 744, δορυπαγεῖς δ' ἔχοντες κυανώπιδας | νῆας ἐπλευσαν, cf. Persæ, 559, 560, κυανώπιδες | νᾶες. Philostratos, imagines, i. 18, γλαυκοῖς μὲν (ἡ ναὺς) γέγραπται χρώμασι, βλοσυροῖς δὲ κατὰ πρῶραν ὀφθαλμοῖς ὅλον βλέπει. Corp. Inscr. Attic. vol. ii, no. 789, col. a, l. 24, αὕτη σκεῦος ἔχει οὐθέν, οὐθ' οἱ ὀφθαλμοὶ ἔνεισιν, no. 791, l. 68, ὀφθαλμὸς κατέαγεν, cf. ll. 41, 75. These entries shew that the eyes were not mere ornaments painted on the ship, but served some useful purpose: and they could hardly be used for anything but hawse-holes. The epithet κυανῶπις suggests that they were made of bronze, like the ram: cf. Aristophanes, equites, 554, 555, κυανέμβολοι | τριήρεις, ranæ, 1318, πρῶραις κυανεμβόλοις. See note 147 on p. 65 as to the nose of a ship, and note 91 on p. 37 as to the cheeks.

<sup>154</sup> Euripides, Iphigenia in Tauris, 1350, 1351, οἱ δ' ἐπωτίδων | ἀγκύρας ἐξανήπτον, cf. Pindar, Pythia, iv. 191, 192, ἐπεὶ δ' ἐμβόλου | κρέμασαν ἀγκύρας ὑπερθεν. There are two slits in the side of each cathead on the ship of about 300 B.C., which is viewed from the front in fig. 22. Each slit is horizontal, and is crossed by a vertical pin in the middle: and abaft of the pin the depth decreases gradually in a slope up to the outer surface of the cathead. On each cathead one of the slits stands a little above and abaft of the other. These slits seem to be intended for a loop of rope to hold the anchor; the two ends of the rope entering the slits from behind and passing out again in front of the pins to form the loop. An elaborate theory has been based upon the supposition that these two slits are the port-holes for the bow oars of an upper and a lower bank, the cathead being merely the front of a long structure serving as an outrigger. There is not any evidence of that.



The genuine anchor with a pair of arms was reckoned among the inventions of Anacharsis<sup>185</sup>; and he was in his prime about 600 B.C. In earlier times the anchors had been made of stone<sup>186</sup>. At first the metal anchors were made of iron; and these were singularly light, an anchor of less than half a hundred-weight being in use in the Athenian navy. But all such anchors had a mass of stone and lead fixed on to them by means of iron clamps, and thus acquired what weight they wanted<sup>187</sup>. Apparently, this ballast was fastened to the anchor near the bottom of the shank, and filled up

<sup>185</sup> Strabo, vii. 3. 9, καὶ τὸν Ἀνάχαρσιν δὲ σοφὸν καλῶν ὁ Ἐφορος τοῦτον τοῦ γένους (Σκυθῶν) φησὶν εἶναι· νομισθῆναι δὲ καὶ ἐπὶ τὰ σοφῶν ἓνα τελεῖα σωφροσύνη καὶ συνέσει· εὐρήματά τε αὐτοῦ λέγει τὰ τε ζώπυρα καὶ τὴν ἀμφίβολον ἀγκυραν καὶ τὸν κεραμικὸν τροχόν. Some sort of anchor had already been invented by Midas, according to Pausanias, i. 4. 5, ἀγκυρα δέ, ἣν ὁ Μίδας ἀνεύρεν, ἥν ἔτι καὶ ἐμὲ ἐν ἱερῷ Διὸς. cf. Pliny, vii. 57, *ancoram (invenit) Ευραλαμῖος; eandem bidentem Anacharsis*. Latin writers often termed the arm of the anchor its tooth, and spoke of its bite: Livy, xxxvii. 30, *ancora unco dente alligavit*, Virgil, *Æneid*, i. 169, *unco non alligat ancora morsu*, vi. 3, 4, *dente ienaci | ancora fundabat naves*. And Greek writers also: Lycophron, 99, 100, καμπύλους σχάσας | πεύκης ὀδόντας, ἔκτορας πλημμυρίδος, Lucian, Lexiphanes, 15, ἔκτορας ἀμφιστόμους. But see Plutarch, de mulierum virtutibus, 8, αἶμα δὲ ὁ Πόλλις κατέμαθε τῇ ἀγκυρᾷ τὸν θυγα μὴ προσόντα· βία γὰρ ἐλκομένης, ὡς τοικεῖν, ἐν τόποις ὑποπέτραις ἀποσπασθεὶς ἔλαθε. Here the arm is termed the talon: and possibly *unco* should be read *unguis* in Lucan, ii. 694, and Valerius Flaccus, ii. 428. The name *γκυρα* appears for the first time in Alcæos, Fr. 18, apud Heraclitum, allegorise, 5, χόλαιοι δ' ἄγκυραι, and then in Theognis, 459, οὐδ' ἄγκυραι ἔχουσιν.

<sup>186</sup> Arrian, periplus, 9, ἐνταῦθα καὶ ἡ ἀγκυρα δέικνυται τῆς Ἀργούς. καὶ ἡ μὲν σιδηρὰ οὐκ ἔδοξε μοι εἶναι παλαιά. λίθινος δὲ τινας ἀλλης θραύσματα ἐδείκνυτο παλαιά, ὡς ταῦτα μᾶλλον εἰκάσαι ἐκεῖνα εἶναι τὰ λείψανα τῆς ἀγκύρας τῆς Ἀργούς. Apollonios Rhodios, i. 955—958, κείσε καὶ εὐναίης ὀλίγον λίθον ἐκλύσαντες | Τίφος ἐννεσίησιν ὑπὸ κρήνῃ ἐλίποντο, | κρήνῃ ὑπ' Ἀρτακίῃ· ἕτερον δ' ἔλον, ὅστις ἀρήρει, | βριθύν. These stone anchors are termed *εὐναί* in the Homeric poems. *Iliad*, i. 436, ἐκ δ' εὐνάς ἔβαλον, κατὰ δὲ πρυμνήσι' ἔδθησαν, xiv. 77, ὅψι δ' ἐπ' εὐνῶν ὀρμίσσομεν. *Odyssey*, ix. 137, οὐτ' εὐνάς βαλλέειν οὔτε πρυμνήσι' ἀνάψαι, cf. xv. 498. The form *εὐναί* occurs again in Apollonios Rhodios, i. 1277, ii. 1282, iv. 888; but gives place to *εὐναί* at iv. 1713. See also Oppian, de piscatione, iii. 373, νέρθεν ἀναψάμενοι τρητὸν λίθον εὐναστήρα. This refers to a plummet for a weel. In the *Odyssey*, xiii. 77, πείσμα δ' ἔλυσαν ἀπὸ τρητοῦ λίθοιο, the stone is clearly a fixture on the shore, with a hole through it for a ship's cable; but according to Herodotos, ii. 96, vessels coming down the Nile used to tow a λίθος τετρημένος astern to steady them against the current. In mooring vessels for floating-bridges the Romans made use of conical baskets filled with stones. Arrian, *anabasis*, v. 7, καὶ ἐνταῦθα ἦδη καθιεται πλέγματα ἐκ λύγου πυραμοειδῆ πλήρη λίθων λογάδων ἀπὸ πύρας ἐκάστης νεώε, τοῦ ἀνέχειν τὴν ναὺν πρὸς τὸν ροῦν.

all the space between the arms, as shewn on the coin of about 350 B.C. in fig. 44. At a later date the anchors were made of lead, and perhaps of other metals<sup>188</sup>. The remains of an anchor of this class, lately recovered near Cyrene, are drawn to scale in figs. 45 to 47. One piece seems to be the stock, and the other two the arms; and these are all of lead, without any alloy<sup>189</sup>. The shank was probably of wood, as that has perished. The three surviving pieces weigh 372 lbs. and 472 and 473 lbs. respectively, or 1317 lbs. altogether; and a wooden shank would increase the weight to more

<sup>187</sup> Corp. Inscr. Attic. vol. ii, no. 807, col. b, ll. 83—88, ἀγκύρας σιδηρ[ας, σ]ταθμὸν μναὶ ΔΔ . . , δεσμὰ σιδηρὰ δοκιμ[α τὰ] ἐκ τῶν λίθων ἐγλυθέν[τα] σὺν τῷ μολύβδῳ, ἀρι[θμὸς] ΗΗΗΔΔΔΠ. This inscription dates from 329 B.C. Inscription from Delos in the Bulletin de Correspondance Hellénique, vol. vi, p. 47, l. 171, ἀγκυρα σιδηρὰ, λίθον οὐκ ἔχουσα, cf. l. 168, ἀγκυρα σιδηρὰ, καὶ λίθος μολυβδοῦς. This inscription dates from 180 B.C. Diodoros, v. 35, ἐπὶ τοσούτῳ δέ (φασι) τοὺς ἐμπόρους διατείνειν τῆς φιλοκερδίας ὥστε, ἐπειδὴν καταγόμενων ὄντων τῶν πλοίων περικτενῆ πολλὸς ἀργυρος, ἐκκόπτειν τὸν ἐν ταῖς ἀγκύραις μολύβδον καὶ ἐκ τοῦ ἀργύρου τὴν ἐκ τοῦ μολύβδου χρεῖαν ἀλλάττεσθαι. In the Athenian inscription the first numeral would be Π in place of Δ, if the weight had exceeded 50 mnas; and 50 mnas are rather less than 50 lbs.

<sup>188</sup> Lucian, Jupiter tragœdus, 47, ἀλλ' ὁ μὲν πρότονος, εἰ τύχοι, ἐς τὴν πρόμῳαν ἀποτέταται, οἱ πόδες δὲ ἐς τὴν πρῶραν ἀμφοτέροι· καὶ χρυσαὶ μὲν αἱ ἀγκυραὶ ἐνίστε, ὁ χηρίσκος δὲ μολυβδοῦς, καὶ τὰ μὲν θφαλα κατάγραφα, τὰ δ' ἔξαλα τῆς νεῶς ἀμορφα. This implies that the anchors used generally to be made of lead at that period, the χηρίσκος being gilt: see note 151 on p. 67. According to the present reading, wooden anchors are mentioned by Moschion, apud Athenæum, v. 43, ἀγκυραὶ δὲ ἦσαν ξύλιναι μὲν τέτταρες, σιδηραὶ δὲ ὀκτώ. But they are not mentioned by any other ancient author: so the reading is probably corrupt. For ξύλιναι read ὑάλιναι. cf. Lucian, veræ historiæ, i. 42, καὶ γὰρ ἀγκύραις ἐχρῶντο μεγάλας, ὑάλιναις, καρτεραῖς. Apparently, some metal was known as ὑάλος, for ὑάλινος cannot here refer to glass; and this metal may be intended in the story of the ποτήριον ὑαλοῦν in Dion Cassius, lvii. 21, Petronius, 51, Pliny, xxxvi. 66, and Isidore, origines, xvi. 16. 6. It is obviously the ship, not the anchor, that Lycophron describes as πεύκη in the passage quoted in note 155: cf. Euripides, Phœnissæ, 209, ἐλάτῃ πλεύσασα, Alcestis, 444, ἐλάτῃ δικώφω.

<sup>189</sup> The components of a sample were lead 98·65 per cent, iron '55, tin '12, silver '011, and gold '0005. Some oxygen was present also. I am indebted to Mr Roberts Austen of the Royal Mint for making the analysis. To judge by look, the material is just the same in a similar arm recovered near Syme and now in the collection of the Archæological Society at Athens. This arm retains a portion of a bar corresponding to the bar that runs across the opening in the stock in fig. 45; and there are traces of another such bar in both the arms belonging to that stock.

than 1400 lbs., or twelve and a half hundred-weight, which is now the allowance for the best bower on a sailing-ship of 250 tons. But this anchor could never have held so firmly as a modern anchor of equal weight; so its ship was probably of lower tonnage. The ship's name, Zeus Hypatos, is inscribed in relief upon the arms<sup>160</sup>. In the Athenian navy the war-ships carried two anchors apiece<sup>161</sup>; but large merchant-ships carried more, and sometimes had three or four anchors out at once; the anchor that was let go last of all—the sheet-anchor now—passing among sailors as the holy anchor<sup>162</sup>. Cork floats were kept for marking the position of

<sup>160</sup> This inscription reads ΣΕΥΣ ΥΠΑΤΟΣ. The words are not repeated; but *Zeus* is on the right arm facing one way, and *υπατος* on the right arm facing the other way. The word ΑΓΙΕΤΩΣ is inscribed upon the arm at Athens. The form of the lettering in these inscriptions dates them near the beginning of the Christian Era.

<sup>161</sup> Corp. Inscr. Attic. vol. ii, no. 807, col. c, ll. 66—102, no. 808, col. d, ll. 119—151, no. 809, col. e, ll. 75—110, no. 811, col. c, ll. 11—32. These are the lists of the entire gear (*εντελή σκευή*) supplied to ships of three and four banks in 330/329 B.C. and following years; and in every case they mention *ἀγκύρας σιδηράς δύο*, or simply *ἀγκύρας δύο*: cf. no. 793, col. f, ll. 6—8, *ἀγκυρῶν ἀριθμὸς*] ΔΠΙΙΙ· αὐται γίγνονται] ἐπὶ ναὺς ΠΙΙΙΙ ἐντελεῖς. In one instance there are four anchors, no. 803, col. c, ll. 54—72: but this is a list of gear supplied to a ship during the term of a command, and consequently does not show that she had all the four at once.

<sup>162</sup> Plutarch, Solon, 19, τὴν δ' ἄνω βουλὴν ἐκάθισεν, οἰόμενος ἐπὶ δυσὶ βουλαῖς ὥσπερ ἀγκύραις ὁρμούσαν ἦττον ἐν σάλῳ τὴν πόλιν ἔσεσθαι, cf. Demosthenes, in Dionysodorum, 44, ἐπὶ δυσὶν ἀγκύραιν ὁρμεῖν. Synesios, epistolæ, p. 164, ἡ μὲν οὖν ναὺς ἐσάλευεν ἐπ' ἀγκύρας μῆας, ἡ ἑτέρα γὰρ ἀπημπούλητο, τρίτην δὲ ἀγκυραν Ἀμάραντος οὐκ ἐκτίησάτο. Euripides, Phaethon, Fr. 7, apud Stobæum, xliii. 3, ναὺν τοι μὴ ἀγκυρ' οὐδαμοῦ σώζειν φιλεῖ, | ὥς τρεῖς ἀφέντι. Acts, xxvii. 29, ἐκ πρύμνης ῥίψαντες ἀγκύρας τέσσαρας. Lucian, fugitivi, 13, ἔδοξε δὴ σκοποῦμένοις τὴν ὑστάτην ἀγκυραν, ἣν ἱερὰν οἱ ναυτιλλόμενοι φασί, καθιέναι, cf. Jupiter tragoedus, 51. Plutarch, præcepta gerendæ rei publicæ, 15. 15, μὴδὲ (δεῖ) ὥσπερ ἐν πλοίῳ σκευὸς ἱερὸν ἀποκεῖσθαι, τὰς ἐσχάτας περιμένοντα χρείας, 19. 8, ὥσπερ ἀγκυραν ἱερὰν ἀράμενον ἐπὶ τοῖς μεγίστοις, cf. Coriolanus, 32.

<sup>163</sup> Pausanias, viii. 12. 1, Ἀρκάδων δὲ ἐν τοῖς δρυμοῖς εἰσιν αἱ δρῦς διάφοροι, καὶ τὰς μὲν πλατυφύλλους αὐτῶν, τὰς δὲ φηγοὺς καλοῦσιν· αἱ τρίται δὲ ἀραιὴν τὸν φλοιὸν καὶ οὕτω δὴ τι παρέχοντα κούφον ὥστε ἀπ' αὐτοῦ καὶ ἐν θαλάσῃ ποιοῦνται σημεῖα ἀγκύραις καὶ δικτύοις. cf. Theophrastus, historia plantarum, iii. 16. 3, δὲ καλοῦσιν οἱ Ἀρκάδες φελλόδρυν. Pliny, xvi. 13, *suberi minima arbor, glans pessima, rara: cortex tantum in fructu, præcrassus ac renascens, atque etiam in denos pedes undique explanatus. usus eius ancoralibus maxime navium piscantiumque tragulis.*

the anchors, when that was necessary<sup>168</sup>; and these did duty as life-buoys, if anybody fell overboard<sup>164</sup>. The cables were sometimes made of chain, but usually of rope: and a thicker rope was needed for large merchant-ships than for the war-ships<sup>165</sup>. Rope-cables of two sizes were in use in the Athenian navy, one described as six-inch and the other as four-inch and a half: but unfortunately there is nothing to shew whether these measurements refer to the circumference or the diameter<sup>166</sup>. Four cables of each sort were carried by each ship, one set to serve the two anchors at the bows, and the other for making the ship fast to the shore by her stern:

<sup>164</sup> Lucian, *Toxaris*, 20, *φelloύς τε γὰρ πολλοὺς ἀφείναι αὐτοῖς καὶ τῶν κοντῶν τινας, ὡς ἐπὶ τούτων ἀπονήξαντο, εἰ τι αὐτῶν περιτύχοιεν, καὶ τέλος καὶ τὴν ἀποβάθραν αὐτὴν οὐ μικρὰν οὖσαν*. 21, *τὸ μὲν γὰρ πρῶτον φελλοῖς τισι περιπεσόντας ἀνέχειν ἐπὶ τούτων ἑαυτοὺς καὶ ἀπονήχεσθαι πονήρως, ὕστερον δὲ τὴν ἀποβάθραν ἰδόντας*, κ.τ.λ.

<sup>165</sup> Aristophanes, *pax*, 36, 37, *ὥσπερ οἱ τὰ σχοινία | τὰ παχέα συμβάλλοντες εἰς τὰς ὀλκάδας*. Arrian, *anabasis*, ii. 21, *ἀλύσεσιν εἰς τὰς ἀγκύρας ἀντὶ σχοινίων χρωμένοι*, cf. Herodotos, ix. 74, *χαλκῆ ἀλύσι δεδεμένην ἀγκυραν σιδηρῆν*. Cæsar, *de bello Gallico*, iii. 13, *ancora, pro funibus, ferreis catenis revincta*.

<sup>166</sup> Corp. Inscr. Attic. vol. ii, no. 807, col. c, ll. 66—102, no. 808, col. d, ll. 119—151, no. 809, col. e, ll. 75—110, no. 811, col. c, ll. 11—32. These are the lists of the entire gear (*ἐντελὴ σκευή*) supplied to ships of three and four banks in 330/329 B.C. and following years; and in every case they mention *σχοινία*, *ὀκτωδάκτυλα* ||||, *ἑξδάκτυλα* ||||. These cables were described as *ἐπίγυα* and *ἀγκύρεια* a few years earlier. Corp. Inscr. Attic. vol. ii, no. 793, col. e, ll. 22—26, *σχοινία*. 'Ακροτέρῃ ἐπίγυα ||, 'Ἡδίστῃ ἐπίγυα ||, *Ναυκράτιδι ἐπίγυα* ||||, 'Ενῇ ἐπίγυα ||, col. h, ll. 19, 20, [ἐπὶ] τὴν 'Ἡδίστην [σχ]οινία ἀγκύρεια ||||, no. 794, col. b, ll. 33—35, *σχοινίων ἀριθ(μὸς) ἐντελ(ῆ) ἐπὶ να(ὺς)* [Π]ΔΔΔ[Π]|| καὶ ἐπίγυ(α) ΔΔΔ||| καὶ ἀγκυρεῶν ἔν. These inscriptions of 357/6 and 356/5 indicate that only two sorts of *σχοινία* were then in use, and that four of each sort made a complete set: so the change was merely in the names. For the name *ἐπίγυα* see Polybios, iii. 46, *τὴν δ' ἀπὸ τοῦ ρεύματος πλευρὰν ἡσφαλίζοντο τοῖς ἐκ τῆς γῆς ἐπίγυοις*, *εἰς τὰ περὶ τὸ χεῖλος πεφυκότα τῶν δένδρων ἐνάπτοντες*, xxxiii. 7, *τάπτογα καὶ τὰς ἀγκύρας*, Lucian, *veræ historie*, i. 42, *ἐξάψαντες αὐτοῦ τὰ ἀπόγεια, καὶ ἐπ' ἀγκυρῶν πλυσίων ὀρμίσσάμενοι*, Aristophanes, *apud Harpocrationem*, s.v. *ἐπιβάτης*:—*εὐ γ' ἐξεκούμβησ' οὐπιβάτης*, ὡς ἐξόσων ἐπίγειον, and Leonidas of Tarentum, in the *Anthology*, x. i. 5, *ἀγκύρας ἀνέλοιο καὶ ἐκλύσαιο γνάια*: also Quintilian, iv. 2. 41, *sublate sunt ancora, solvimus oram*, and Livy, xxii. 19, *resolutis oris, in ancoras evehuntur*, xxviii. 36, *orasque et ancoras, ne in moliendo mora esset, pracidunt*. These shore-cables seem to be the same as the stern-cables, *πρυμνήσια*, which are likewise named apart from the anchor-cables; and also the same as the mooring-cables, *πέλοματα*, which were likewise made fast to the shore. *Odyssey*, xv. 498, *ἐκ δ' εὐνὰς ἐβαλον, κατὰ δὲ*

and ships everywhere carried some shore-cables at the stern in addition to the anchor-cables at the bows. Ships being thus fitted for cables at each end, anchors could easily be put out astern, if needed there for any manœuvre or to help the ship ride out a gale<sup>167</sup>.

The ships used to be steered with a pair of very large oars at the stern, one on either side<sup>168</sup>. In vessels built for rowing either way, and therefore shaped alike at stem and stern, a pair was carried at each end<sup>169</sup>. And occasionally a second

πρυμνήσι' ἔθισαν, x. 96, πέτρης ἐκ πείσματα δῆσας, xiii. 77, πείσμα δ' ἔλυσαν ἀπὸ τρητοῦ λίθοιο, xv. 286, τοὶ δὲ πρυμνήσι' ἔλυσαν, cf. Apollonios Rhodios, i. 912, 913, πρυμνήσια δὲ σφίσιν "Ἄργος | λῶσεν ὑπὲκ πέτρης ἀλιμυρέος. Athenæos, xv. 12, λυσαμένους δ' αὐτοὺς τὰ πρυμνήσια καὶ τὰς ἀγκύρας ἀνελομένους. Polyzenos, iv. 6. 8, ἄλλοι μὲν ἀνέσπων τὰ πρυμνήσια, ἄλλοι δὲ ἀγκύρας ἀνιμῶντο. Philostratos, vita Apollonii, iii. 56, πείσμα ἐκ τῆς νήσου βάλλεσθαι, vi. 12, βάλλεσθαι τινὰ ἀγκυραν ἢ πείσμα. The πρυμνήσια and the πείσματα are mentioned together in Odyssey, ix. 136, 137, ἐν δὲ λιμὴν ἐθορμος, ὧ' οὐ χρεώ πείσματός ἐστιν, | οὐτ' εὐνὰς βαλέειν οὔτε πρυμνήσι' ἀνάψαι. But that is mere tautology; and the passage is translated accordingly by Virgil, Æneid, i. 168, 169, *hic fessas non vincula naves | ulla tenent, unco non alligat ancora morsu*. Here πείσματα is rendered by *vincula*, as in Pliny, xxxii. 1, *non vincula ulla, non ancora*: but elsewhere by *retinacula*. Ovid, metamorphoses, xv. 696, *solvunt retinacula furpis*, cf. xiv. 547.

<sup>167</sup> Polyzenos, iii. 9. 63, Ἰφικράτης περὶ Φοινίκην καταπλέων ἑκατὸν τριακοντόροις, ἐνθα τεναγώδης αἰγιαλὸς ἦν, παρήγγειλεν, ὅταν τὸ σημεῖον ἀναδευχθῇ, τοῖς μὲν κυβερνήταις ἀγκυραν ἀφίεναι κατὰ πρύμναν καὶ τὴν καταγωγὴν ἐν τάξει ποιέεισθαι, τοῖς δὲ στρατιώταις, κ.τ.λ. .... ὥς δὲ ἤδη σύμμετρον ὑπέλαβεν εἶναι τὸ τῆς θαλάσσης βάθος, ἀνέτεινε τὸ σημεῖον τῆς ἐκβάσεως. αἱ τριακόντοροι μὲν ἐν τάξει κατήγοντο διὰ τῶν ἀγκυρῶν, οἱ δὲ ἄνδρες, κ.τ.λ. This happened about 375 B.C. Appian, de rebus Punicis, 123, Ῥωμαῖοι δὲ ὁ μὲν ἐπίπλους ἦν ῥάδιος, καὶ τὸ μάχεσθαι ναυσὶν ἐστώσας εὐμαρές· αἱ δ' ἀναχωρήσεις δι' ἀναστροφὴν τῶν νεῶν, μακρῶν οὐσῶν, βραδείαι τε καὶ δυσχερεῖς ἐπεγίνοντο· ὅθεν ἀντέπασχον ἐν τῷδε τὰ ὁμοία, ὅτε γὰρ ἐπιστρέφοντο, ἐπλήσσοντο ὑπὸ τῶν Καρχηδονίων ἐπιπλεόντων. μέχρι νῆς Σιδιτῶν πέντε, αἱ φίλιαι Σικιπίνους εἰποντο, τὰς μὲν ἀγκύρας καθήκαν ἐκ πολλοῦ διαστήματος ἐς τὸ πέλαγος, ἀψάμεναι δ' ἀπ' αὐτῶν κάλους μακροὺς, εἰρεσίᾳ τοῖς Καρχηδονίοις ἐπέπλεον, καὶ ὅτε ἐγγρίμψαιαν, ὑπεχώρουν, τοὺς κάλους ἐπισπώμεναι κατὰ πρύμναν· αὐτῆς τε ῥοθίῳ καταπλέουσαι, πάλιν ἀτήγοντο κατὰ πρύμναν. This happened in 147 B.C. Appian, de bellis civilibus, v. 89, τὰς ναὺς ἐκατέρωθεν ἀγκύρας ἐκ τε τοῦ πελάγους καὶ ἀπὸ τῆς γῆς διεκράτουν. This was in a gale in 38 B.C. Acts, xxvii. 29, ἐκ πρύμνης μψαντες ἀγκύρας τέσσαρας. This was also in a gale. An anchor is represented at the stern of one of the ships on Trajan's Column, where the fleet appears to be going down a river.

<sup>168</sup> Corp. Inscr. Attic. vol. ii, no. 793, col. a, ll. 23—27, [π]ηδαλίων ἀριθμοὺς ΗΗΗΗΠΔΓΙΙΙΙ· ταῦτα γίνεταί ἐπὶ ναὺς ΗΗΔΔΔΙΙΙΙ καὶ ἐν πηδάλιον. cf. Heliodoros, Æthiopica, v. 22, τῶν πηδαλίων θάτερον ἀποβαλόντες, Apuleius,

pair was carried near the stern in vessels of ordinary build ; so that if the ship was pitching heavily enough for the usual steering-oars to come out of the water at every plunge, the steering could be managed with another pair placed a little further forward<sup>170</sup>. The steering-oars were fastened to the sides of a ship just below the gunwale, either by passing the loom of the oar through some sort of loop or ring, or else by tying it between a pair of pegs<sup>171</sup>: and these fastenings may be noticed on the ships in fgs. 3 to 5, 17, 18 and 40. The

metamorphoses, ii. 14, *utroque regimine amisso*. Herodotos, ii. 96, *πηδάλιον δὲ ἐν ποιῶνται, καὶ τοῦτο διὰ τῆς τρόπιος διαβύνεται*. Herodotos is speaking of vessels on the Nile ; and his emphasis shews how unusual it was for a vessel to have only a single steering-oar. In these Egyptian vessels the steering-oar must have passed through the after end of the keel, where it curved upwards in place of a stern-post : see p. 39 and notes 95, 96.

<sup>166</sup> Athenæos, v. 37, *πηδάλια δ' εἶχε τέτταρα, . . . διπρυμνος δ' ἐγεγόνει καὶ διπρυμνος*. Dion Cassius, lxxiv. 11, *καὶ τινὰ αὐτῶν ἐκατέρωθεν καὶ ἐκ τῆς πρύμνης καὶ ἐκ τῆς πῦρας πηδαλίοις ἦσκετο*. Tacitus, annales, ii. 6, *arpositis utrimque gubernaculis, converso ut repente remigio hinc vel illinc appellerent*.

<sup>170</sup> Polyænus, iii. 11. 14, *Σαβρίας πρὸς τοὺς πελαγίους πλοῦς καὶ τοὺς ἐν τῇ θαλάττῃ χειμῶνας κατεσκεύαζεν ἐκάστη τῶν νηῶν δισὰ πηδάλια. καὶ τοῖς μὲν ὑπάρχουσιν ἐν ταῖς εὐδαίαις ἐχρήτο· εἰ δὲ ἡ θάλασσα κοίλῃ γένοιτο, θάτερα διὰ τῆς παρεξείρεσις κατὰ τὰς θρανίτιδας κώπας παρετίθει, τοὺς αὐχένους ἔχοντα καὶ τοὺς οἰακας ὑπὲρ τοῦ καταστρώματος, ὥστε ἐξαιρομένης τῆς πρύμνης τούτοις τὴν ναὺν κατευθύνεσθαι*. Here αὐχὴν must mean the loom of the oar, the handle being known as οἰαξ : but it afterwards came to mean the oar itself. Leo, tactica, xix. 8, *καὶ τοὺς δύο κυβερνήτας τῶν τοῦ δρόμωνος αὐχένων*. See note 172 as to the meanings of οἰαξ. The *παρεξείρεσις* is here the space between the rowers and the stern, as also in Polyænus, iii. 11. 13, *Σαβρίας πρὸς τὰς ἐπιβολὰς τῶν κυμάτων ὑπὲρ τὴν παρεξείρεσιν ἐκατέρου τοίχου δέβρεις παρέβαλεν, καὶ κατηλώσας ἀρτίως τῷ καταστρώματι κατὰ τὸ ὕψος φράγμα κατελάμβανεν αὐτὸ πρὸς τὰς παρεξείρεσις. τοῦτο δὲ ἐκώλυε τὴν ναὺν ὑποβρύχιον φέρεσθαι καὶ τοὺς ναῦτας ὑπὸ τῶν κυμάτων βρέχεσθαι· καὶ τὰ ἐπιφερόμενα κύματα οὐχ ὀρώντες διὰ τὴν τοῦ φράγματος πρόσθεσιν οὐκ ἐξανίστατο διὰ τὸν φόβον οὐδὲ τὴν ναὺν ἐσφαλλόν*. See note 141 on p. 62 for another meaning of *παρεξείρεσις*.

<sup>171</sup> Euripides, Helena, 1536, *πηδάλια τε ζεύγλαισι παρακαθίετο*. Acts, xxvii. 40, *ἀνέντες τὰς ζευκτηρίας τῶν πηδαλίων*. cf. Aristotle, mechanica, 6, ἥ μὲν δὴ τὸ πηδάλιον προσέφευκται, δεῖ οὖν τι τοῦ κινουμένου μέσον νοεῖν, καὶ ὥσπερ ὁ σκαλμὸς τῇ κώπῃ. The term *ζεύγσις* is used by Callixenos in speaking of oars for rowing, when he may really be referring to the steering-oars : see p. 10 and note 25. Orpheus, Argonautica, 278, 279, *ἐπὶ δ' αὐτ' οἰηκας ἔδησαν, | πρυμνόθεν ἀρτήσαντες, ἐπεσφίγξαντο δ' ἱμᾶσιν*. The term οἰαξ must here denote the entire steering-oar : see next note. Vegetius, iv. 46, *per has (bipennes) in medio ardore pugnandi peritissimi nautæ vel milites cum minoribus scaphulis secreto incidunt funes, quibus adversariorum ligata sunt gubernacula*.

steering-oars could thus be worked like oars for rowing; and while the rowers drove the ship ahead and astern by pulling their oars forward or pushing them aft, the steerer drove her to port and starboard by pulling his oar inboard or pushing it outboard, if he steered with one, and moving the other in the same direction, if he steered with two<sup>172</sup>. But this method was impracticable when the steering-oars were big and heavy; and they used then to be worked by turning them round a little way. So long as the blades were parallel to the ship's keel, the ship went straight ahead: but if the oars were

<sup>172</sup> Aristotle, *mechanica*, 6, διὰ τί τὸ πηδάλιον, μικρὸν δὲ καὶ ἐπ' ἐσχάτῳ τῷ πλοῖ, τοσαύτην δύναμιν ἔχει ὥσθ' ὑπὸ μικροῦ σκακος καὶ ἐνδὲς ἀνθρώπου δυνάμει, καὶ ταύτης ἡρεμαίας, μεγάλα κινεῖσθαι μεγέθη πλοίων; ἡ διότι καὶ τὸ πηδάλιον ἐστὶ μοχλός, καὶ μοχλεῖται ὁ κυβερνήτης; ἡ μὲν οὖν προσήρμωσται τῷ πλοῖ, γίνεται ὑπομόχλιον, τὸ δ' ὅλον πηδάλιον ὁ μοχλός, τὸ δὲ βάρος ἡ θάλασσα, ὁ δὲ κυβερνήτης ὁ κινῶν..... ἡ μὲν οὖν κώπη κατὰ πλάτος τὸ βάρος ὠθοῦσα καὶ ὑπ' ἐκείνου ἀντωθουμένη εἰς τὸ εὐθὺ προάγει· τὸ δὲ πηδάλιον, ὥσπερ κάθηται πλάγιον, τὴν εἰς τὸ πλάγιον ἡ δεῦρο ἡ ἐκεῖ ποιεῖ κίνησιν..... ἡ μὲν δὴ τὸ πηδάλιον προσέξενται, δεῖ οὖν τι τοῦ κινουμένου μέσον νοεῖν, καὶ ὥσπερ ὁ σκαλμός τῇ κώπῃ· τὸ δὲ μέσον ὑποχωρεῖ ἡ ὁ οὐκ μετακινεῖται. ἐὰν μὲν εἰσω ἀγῃ, καὶ ἡ πρύμνα δεῦρο μεθέστηκεν, ἡ δὲ πρῶρα εἰς τούναντίον νεύει. cf. Plato, *Alcibiades*, p. 117 C, τί δ' εἰ ἐν νηὶ πλόεις, ἅρα δοξάζεις ἂν, πότερον χρὴ τὸν σκακα εἰσω ἀγειν ἢ ἐξω; Aristotle is followed by Vitruvius, x. 3-5, *quasiadmodum etiam navis onerariæ maximæ gubernator, ansam gubernaculi tenens, qui οὐκ ἄν a Græcis appellatur, una manu, momento per centri librationem pressionibus artis agilians, versat eam amplissimis et immanibus mercis et penus ponderibus oneratis, reading librationem for rationem*—cf. 4, *per scapi librationem*—and assuming that *artis* comes from *artus*. The term οὐκ is here applied to the handle of the steering-oar; and so also in Polyænos, iii. 11. 14—see note 170—and in Plutarch, *Lysander*, 12, ἦσαν δὲ τινες οἱ τοὺς Διοσκόρους ἐπὶ τῆς Λυσάνδρου νεὸς ἐκατέρωθεν ἄστρα τοῖς οὐκαῖν ἐπιλάμψαι λέγοντες. But it used also to be applied to the entire steering-oar, as in Orpheus, *Argonautica*, 278—see last note—and in Euripides, *Iphigeneia in Tauris*, 1356, 1357, καὶ διευθυντηρίας | οὐκαας ἐξηροῦμεν εὐπρύμνου νεὸς. This can only mean that they took away the steering-oars, which was then the ordinary way of disabling a ship: cf. Herodotos, iii. 136; Athenæos, viii. 61; Xenophon, *anabasis*, v. 1. 11. The cognate term οὐκίον denotes the entire steering-oar in *Odyssey*, ix. 539, 540, καὶ δ' ἐβαλεν μετόπισθε νεὸς κυανοπρῶροιο | τυτθόν, ἐδεύησεν δ' οὐκίον ἄκρον ἰκέσθαι. This term occurs again in *Odyssey*, xii. 218, ἐπεὶ νηὸς γλαφυρῆς οὐκία νωμῆς, and in *Iliad*, xix. 43, καὶ ἔχον οὐκία νηῶν, but without anything to shew whether it denotes the whole of the oar or only the handle. Apparently οὐκ was synonymous with πλῆκτρον. Herodotos, i. 194, ἰθύνεται δὲ ὑπὸ τε δύο πλῆκτρων καὶ δύο ἀνδρῶν ὀρθῶν ἐστεῶτων, καὶ ὁ μὲν εἰσω ἔλκει τὸ πλῆκτρον, ὁ δὲ ἐξω ὠθέει. Sophocles, *Fr.* 151, apud Pollucem, x. 133, πλῆκτροις ἀπευθύνουσιν οὐραν τρώπιν. Silius Italicus, xiv. 401, 402, *residentis puppe magistri | affixit plectro dextram, sc. telum*.

turned to bring the fore part of each blade to starboard and the after part to port, the action of the water on the oars was enough to thrust the ship's stern to starboard and thus send her head to port; and, conversely, if the oars were turned to bring the fore part of each blade to port and the after part to starboard, the ship's head went to starboard. There was probably a tiller in the loom or handle of each steering-oar and a piece of gear to join these tillers; so that the steerer could turn both oars at once<sup>173</sup>. In the Egyptian ships of early date, as in fgs. 3 to 5, the steering-oars appear to be

<sup>173</sup> Plutarch, *de fortuna Romanorum*, 4, οὐ μὲν γὰρ ἀπειθήs, κατὰ Πίνδαρον, οὐδὲ δίδυμον στρέφουσα πηδάλιον, sc. ἡ Τύχη. Lucian, *navigium*, 6, κάκεινα πάντα μικροί τις ἀνθρωπίσκος γέρων ἤδη ἐσωζεν ὑπὸ λεπτῇ κάμακι τὰ τηλικαῦτα πηδάλια περιστρέφων. The equivalent of κάμαξ was *adminiculum*. Pliny, vii. 57, *adminicula gubernandi (addidit) Tiphys*. In the passage just quoted from Lucian the term κάμαξ is used in the singular with πηδάλια in the plural, and so also is οἶαξ in Plato, *politicus*, p. 272 E, πηδάλιον οἶακος ἀφέμενος, sc. ὁ κυβερνήτης, and likewise *clavus* with *gubernacula* in Cicero, *pro Sestio*, 9, *clavum tanti imperii tenere et gubernacula rei publice tractare*. These passages imply that the two steering-oars were controlled by a single piece of gear, and that this used sometimes to be termed οἶαξ and *clavus* as well as κάμαξ and *adminiculum*; and various other passages imply that ships were steered by turning the *clavus* or οἶαξ. Quintilian, ii. 17. 24, *dum clavum rectum teneam*. Virgil, *Æneid*, v. 177, *clavumque ad litora torquet*. Euripides, *Helena*, 1590, 1591, πάλιν πλέωμεν, ναυβάταν. ἐλένε σὺ· | σὺ δὲ στρέφ' οἶακα. Æschylos, *septem adversus Thebas*, 62, ὥστε ναὺς κεδνὸς οἰακοστρόφος. Pindar, *Isthmia*, iii. 89, κυβερνατῆρος οἰακοστρόφου. The expression χαλινὰ οἰήκων is merely a pleonasm of Oppian, *de piscatione*, i. 189—192, ἐσπονται πομπῆς ὁμόστολοι, ἄλλοθεν ἄλλος, | ἀμφιπερισκαίροντες εὐζυγον ἄρμα θαλάσσης, | τοίχους τ' ἀμφοτέρους, περὶ τε πρυμναῖα χαλινὰ | οἰήκων· ἄλλοι δὲ περὶ πρόφῃν ἀγέρονται. For the converse metaphor, see Oppian, *de venatione*, i. 96, ἱππων κυβερνητῆρα χαλινόν, and Æschylos, *septem adversus Thebas*, 206, ἱππικῶν πηδάλιον. A similar pleonasm is introduced by Statius, *Thebais*, x. 182—185, *non secus, amisso medium cum præsidi puppis | fregit iter, subit ad vidui moderamina clavi | aut laterum custos, aut quem penes obvia ponto | prora fuit*. The term *moderamen* was used by itself, like *regimen*, to denote a steering-oar. Ovid, *metamorphoses*, iii. 644, *capiatque alius moderamina, dixi*, xv. 726, *innixus moderamine navis*, iii. 593, 594, *addidici regimen, dextra moderante, carina | flectere*, xi. 552, *frangitur et regimen*; Apuleius, *metamorphoses*, ii. 14, *utroque regimine amisso*. The πτέρυξ was presumably the blade of the steering-oar. Corp. Inscr. Attic. vol. ii, no. 790, col. b, ll. 44—46, ἔχει πη[δ]άλια δύο, τοῦ ἐ[τέρου] ἡ πτέρυξ ἀδόκιμος [π]α[ρά]κει[ται]. Apollonios Rhodios, iv. 931, ἡ δ' ἐπιθεν πτέρυγος θίγει πηδάλιο. Apollonios is narrating how a goddess rose from the deep and laid her hand upon the steering-oar; so the πτέρυξ was necessarily at the lower end.



attached to a pair of posts upon the deck besides the rings underneath, as though their function was simply to turn upon their axis: and in the Roman ships of about 200 A.D., as in fig. 29, the motion of the steering-oars seems to be restricted to the same extent by ropes fastened through the blades. In these Roman ships both the oars were sheltered from the impact of the waves by a prolongation of the upper waling-pieces, or something of the sort, as may be seen in figs. 26, 28, 29, 36 and 38. Curiously, the steering-gear was used to keep the ship on either tack, when the wind was light, the yard being left amidship; though in a stronger wind the yard was properly braced round and the square-sail trimmed accordingly<sup>174</sup>.

In every age and every district of the ancient world the method of rigging ships was substantially the same: and this method is first depicted by the Egyptians. Their ships on the Red Sea about 1250 B.C., as in figs. 4 and 5, had one mast with two yards, and carried one large square-sail. The mast was secured to a prop at its foot to keep it steady, and was held by two fore-stays and one back-stay; the two halyards of the upper yard being carried down to the quarters, so that the strain on these relieved the back-stay and partially obviated the need for shrouds. It is strange that the mast had no shrouds at all: but a curious double mast, like a pair of sheer-legs, had formerly been carried by vessels on the Nile, as in fig. 1, which mast was always set athwartship, so that no shrouds were needed on these vessels; and possibly mere force of habit kept the Egyptians from fitting shrouds to the single mast of later times. Each yard was formed of two spars lashed together, so as to avoid the waste of timber in tapering the thicker end of a single spar to balance with the thinner end: and this device was adopted by the Greeks and Romans, as may be seen from the Athenian ships of about 500 B.C. in fig. 19 and the Pompeian ship of about 50 A.D. in fig. 26, and was thus transmitted to the modern world<sup>175</sup>. The yards were each worked by two braces; and there were numerous lifts to support the lower-yard at all

<sup>174</sup> Aristotle, *mechanica*, 8, quoted in note 206 on p. 96.

times and the upper-yard when lowered. The other ropes were brails for taking in the sail.' In the great relief representing the battle in the Mediterranean about 1000 B.C. the rigging is indicated very roughly both in the victorious Egyptian ships, as in fig. 6, and in the defeated Asiatic ships, as in figs. 7 and 8: but two things at least are clear. The lower-yard had been discarded; so that the lower corners of the sail must now have been controlled by sheets. And the sail was no longer taken in by brails stretching down obliquely from the centre of the upper-yard, but by brailing-ropes stretching vertically down from several points along the yard. A figure of a square-sail on a mast with two yards forms the hieroglyph *nef*, and forms part of the hieroglyph *chont*, which represents a boat: so the unnecessary lower-yard had been in use from very early times. But now it was discarded finally. In the vase-paintings of about 600 B.C. in figs. 12 and 13, which come from Etruria and Attica respectively, the ships certainly look as though they had this yard. But in the former the painter has simply reproduced the hieroglyph *chont*; as was perhaps to be expected, for the vase was made by some Greek settler in the Delta of the Nile, and thence exported to Etruria. And in the latter the absurdly straight sides to the sail shew that its straight base is solely due to the painter's methods.

The Phœnician ships of about 700 B.C., as in fig. 10, had one mast with one yard, and carried a square-sail. They are sometimes represented with two fore-stays and a back-stay, sometimes with two back-stays and a fore-stay; and always with four other ropes, which seem to be sheets and braces: but no further details can be traced. These ships, then, were rigged like the ships that fought in the Mediterranean three centuries before: so this scheme of rigging had probably been long in use among the Phœnicians; and thus came to be adopted by the Greeks, when they began seafaring.

<sup>175</sup> This explains why the Greeks and Romans usually spoke of the yard in the plural as *κεραῖαι* or *antennæ*. The Greeks should strictly have used the dual: but the plural does not imply that there were more than two spars. Corp. Inscr. Attic. vol. ii, no. 802, col. a, ll. 4, 5, *κεραῖαι μεγάλαι· ἡ ἑτέρα ἀδόκιμος*.

The Homeric poems shew clearly enough how the earliest Greeks rigged their ships. There was the *histos* or mast, supported at its foot by a prop termed *histopede*, and held by two *protonoi* or fore-stays and an *epitonos* or back-stay. When the mast was not in use, it lay aft in a rest termed *histodoke*; being raised thence and lowered thither again by means of the fore-stays<sup>176</sup>. Upon the mast was the *epikrion* or yard; and upon this was the sail. The sail is styled indifferently *speiron* and *histion* and *histia*; the plural perhaps denoting that it was formed of many pieces, as in the Athenian ship of about 600 B.C. in fig. 13: and its whiteness is emphasized. Ropes termed *hyperai* and *kaloi* and *podes* are mentioned, but without any indication of their nature: and the presence of halyards and brailing-ropes is implied<sup>177</sup>. The *hyperai* and *podes*, that is to say, the upper ropes and the

<sup>176</sup> Odyssey, xii. 178, 179, οἱ δ' ἐν νηὶ μ' ἔδῃσαν ὁμοῦ χεῖρας τε πόδας τε | ὀρθὸν ἐν ἱστοπέδῃ, ἐκ δ' αὐτοῦ πείρατ' ἀνήκτον, where αὐτοῦ must refer to ἱστοῦ. cf. Alcæus, Fr. 18, apud Heraclitum, allegoriæ, 5, περ μὲν γὰρ ἄντλος ἱστοπέδαν ἔχει. Odyssey, xii. 409—412, ἱστοῦ δὲ προτόνους ἐρῆξε' ἀνέμοιο θύελλα | ἀμφοτέρους· ἱστὸς δ' ὀπίσω πέσεν, ὅπλα τε πάντα | εἰς ἄντλον κατέχυνθ'· ὁ δ' ἄρα πρύμνῃ ἐνὶ νηὶ | πλῆξε κυβερνήτew κεφαλῇν. These verses are imitated by Apollonios Rhodios, i. 1203, 1204, ὑψόθεν ἐμπλήξασα βοῇ ἀνέμοιο κατὰξ | αὐτοῖσι σφῆνεσσιν ὑπὲκ προτόνων ἐρύσσηται. The σφῆνες are probably the παραστάται which replaced the ἱστοπέδη; see note 181. Odyssey, xii. 422, 423, ἐκ δὲ οἱ ἱστὸν ἄραξε ποτὶ τρόπῳ· αὐτὰρ ἐπ' αὐτῷ | ἐπίτονος βέβλητο, βοὸς βωοῖο τετευχώς. There is no direct proof that ἐπίτονος means back-stay; but as πρότονος means fore-stay, there is not much room for doubt. Iliad, i. 434, ἱστὸν δ' ἱστοδόκη πέλασαν, προτόνοισιν ὑφέντες. Odyssey, ii. 424, 425, ἱστὸν δ' εἰλάτων κοιλῇς ἔντοσθε μεσόδμῃς | στήσαν δείραντες, κατὰ δὲ προτόνοισιν ἔδῃσαν. These verses are imitated by Apollonios Rhodios, i. 563, 564, δὴ ῥα τότε μέγαν ἱστὸν ἐνεστήσαντο μεσόδμῃ, | δῆσαν δὲ προτόνοισι τανυσσάμενοι ἑκάτερθεν. In his opinion, then, the fore-stays were made fast on either side of the bow, not right forward. See also Lucian, amores, 6, τὸν ἱστὸν ἐκ τῶν μεσοκοιλῶν ἄραντες, where μεσοκοιλῶν seems intended to convey the sense of κοιλῇς μεσόδμῃς, and clearly is equivalent to κοιλῇς ἱστοδόκης in Apollonios Rhodios, ii. 1262—1264, αὐτίκα δ' ἱστία μὲν καὶ ἐπικρίων ἐνδοθὶ κοιλῇς | ἱστοδόκης στείλαντες ἐκόςμεον· ἐν δὲ καὶ αὐτὸν | ἱστὸν ἀφαρ χαλάσαντο παρακλιδόν. Apparently ἔντοσθε means *from within* and goes with δείραντες in the Odyssey, though Apollonios thinks it means *within* and goes with στήσαν: so the μεσόδμη was probably the ἱστοδόκη under another name, or else the hold containing the ἱστοδόκη. Thus the μεσόδμῃς are contrasted with the decks at stem and stern by Lycophron, 751, 752, αὐταῖς μεσόδμῃς καὶ σὺν ἱκρίοις βαλεῖ | πρὸς κύμα δύκτιν. The ἱστοδόκη is mentioned by Ptolemy, Almagest, viii. 1, Ἀργοῦς ἀστερισμός: but the measurements are too corrupt for fixing its position accurately, though they indicate a place towards the stern.

foot ropes, are presumably braces and sheets; while the *kaloî* are certainly the brailing-ropes, for Herodotos employs this name for them in noting the perversity of the Egyptians in putting the brailing-rings on the after side of the sail<sup>178</sup>.

The Greek ships represented in vase-paintings invariably have one mast with one yard, and carry a square-sail; and probably they are all intended to have the same sorts of ropes, though these are always sketched carelessly. The Athenian ships of about 500 B.C. in fgs. 17 to 19 have numerous brailing-ropes; and in the merchant-ship, which presumably was rigged on a larger scale than the war-ships, each brailing-rope makes several loops round the sail. In these ships, and also in the earlier Athenian ship in fg. 13, the halyards are carried down to the waist, and thus take the place of shrouds in supporting the mast.

<sup>177</sup> *Odyssey*, v. 254, ἐν δ' ἱστὸν ποιεὶ καὶ ἐπικρίον ἄρμενον αὐτῷ, 260, ἐν δ' ὑπέρas τε κάλους τε πόδας τ' ἐνέδησεν ἐν αὐτῇ. 316—318, μέσον δέ οἱ ἱστὸν ἔαξε | δεινῇ μισγομένῳ ἀνέμῳ ἐλθοῦσα θύελλα, | τηλοῦ δὲ σπεῖρον καὶ ἐπικρίον ἐμπεσε πόντῳ. *Iliad*, i. 480, 481, οἱ δ' ἱστὸν στήσαντ', ἀνὰ θ' ἱστία λευκὰ πέτασσαν· | ἐν δ' ἄνεμος πρήσεν μέσον ἱστίων. *Odyssey*, ii. 426, 427, ἔλκον δ' ἱστία λευκὰ ἐυστρέπτοισι βοεῦσιν· | ἐμπήρσεν δ' ἄνεμος μέσον ἱστίων. iii. 10, 11, οἱ δ' ἰθὺς κατὰγοντο, ἰδ' ἱστία νηὸς εἰσης | στεῖλαν ἀείραντες, τὴν δ' ὥρμισαν, ἐκ δ' ἔβαν αὐτοί. xii. 170, 171, ἀνστήσαντες δ' ἔταροι νεὸς ἱστία μῆρυσαντο, | καὶ τὰ μὲν ἐν νηὶ γλαφυρῇ θέσαν, οἱ δ' ἐπ' ἐρετμά, κ.τ.λ. These last verses shew that there were halyards for hoisting sail; and also brailing-ropes of some sort, as the crew took in the sail by pulling it up, στεῖλαν ἀείραντες, μῆρυσαντο. For the latter term, see Sophocles, *Fr.* 699, apud *Athenæum*, iii. 55, ναῦται δὲ μῆρυσαντο νηὸς ἱσκάδα, and Oppian, *de venatione*, i. 50, ἰχθὺν ἀσπαίροντα βυθῶν ἀπομῆρυσσασθαι. The meaning was apparently to coil up cords or cables, and so haul up things attached to them.

<sup>178</sup> Herodotos, ii. 36, τῶν ἱστιῶν τοὺς κρίκους καὶ κάλους οἱ μὲν ἄλλοι ἐξωθεν προσδέουσι, Αἰγύπτιοι δὲ ἔσωθεν. The brailing-ropes, and the rings to keep them in their place, may be seen upon the fore side of the sail on the Roman ship in fg. 29: and these clearly are the ropes and rings intended by Herodotos. Moreover, the word κάλος or κάλως occurs in various phrases where it can hardly refer to any ropes but these. Plato, *Protagoras*, p. 338, μήτ' αὖ Πρωταγόραν (συμβουλεύω) πάντα κάλων ἐκτείναντα, οὐρὰ ἐφέντα, φεύγειν εἰς τὸ πέλαιος τῶν λόγων, cf. *Sisyphos*, p. 389, τὸ λεγόμενόν γε, πάντα κάλων ἐφέντες. Aristophanes, *equites*, 756, νῦν δὴ σε πάντα δεῖ κάλων ἐξίέναι σεαντοῦ. Euripides, *Medea*, 278, ἐχθροὶ γὰρ ἐξῆσι πάντα δὴ κάλων, *Troades*, 94, ὅταν στράτευμ' Ἀργεῖον ἐλθῇ κάλως. To let out the brailing-ropes was to let out the sail; and to let these ropes out altogether was to let the sail out to the full, and hence by metaphor, to make every effort. Oppian, *de piscatione*, ii. 223, γαστρὶ δὲ πάντας ἐπιτρῶπῳ κάλως, where he alludes to gluttons; while now-a-days a sail is said to belly.

T.

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The inventories of the Athenian dockyards shew that in 330 B.C. the rigging for the war-ships of three and four banks consisted of the *histos* or mast, the *keraiai* or yard, the *histon* or sail, and the *topeia* or ropes; and that in four-banked ships the *topeia* consisted of eighteen loops of *kalodia*, two *himantes*, a double *agkoina*, two *podes*, two *hyperai*, and a *chalinós*<sup>179</sup>. The distinction between these six sorts of ropes is not indicated by the inscriptions; nor can it safely be inferred from the language of ancient authors, since technical terms were often used very loosely: the term *topeia*, for example, which here denotes the ropes collectively, being popularly employed to denote the halyards alone. But probably there were

<sup>179</sup> Corp. Inscr. Attic. vol. ii, no. 807, col. c, ll. 66—102, no. 808, col. d, ll. 119—151, no. 809, col. e, ll. 75—110, no. 811, col. c, ll. 11—32. These are the lists of the entire gear (*ἐντελὴ σκεύη*) supplied to ships of three and four banks in 330/329 B.C. and following years; and the only items of rigging included therein are *ιστός*, *κεραῖαι*, *ιστίον*, *τοπεῖα*. In no. 809 the word *τοπεῖα* is missing: but line 106 of col. e may be restored as *κατάβλημ[α, τοπεῖα]* to match line 30 of col. c in no. 811. The suggested restoration *καταβλήμ[ατ]α* seems too short. For *τοπεῖα* see no. 807, col. a, ll. 141—146, 153, 159—163, 178—183, no. 808, col. b, ll. 189—193, no. 809, col. b, ll. 222—227, *τοπεῖα τετρήρων*, *οἱ τοπεῖα ἐπὶ τετρήρεις*, *ἐκάστης καλωδίων μηρύματα* ΔΠ|||, *ἱμάντες* ||, *ἀγκοῖνα διπλῇ*, *πόδες* ||, *ὑπέραι* ||, *χαλιὼς* |. See also no. 807, col. a, ll. 62—64, 73—75, no. 808, col. b, ll. 110, 111, 115—118, no. 809, col. b, ll. 145—147, 150—152, *τοπεῖα ἐπὶ ταῦς* ΗΗΠΔΔ|, *πλὴν μηρυμάτων καλωδίων* |||, which shews that there were *μηρύματα καλωδίων* among the *τοπεῖα* for three-banked ships, but unfortunately gives no further information. The *κάλοι* or *κάλως* had probably been replaced by these *καλωδία* of smaller size, when the brailing-ropes began to be looped round the sail instead of merely passing down the front; and the loops might well be termed *μηρύματα*. If so, there were not eighteen separate brailing-ropes, but six with three loops each, or nine with two loops.

<sup>180</sup> Stratigis, Macedones, Fr. 1, *τὸν πέπλον δὲ τοῦτον | ἔλκουσαν ὀνέουσες τοπελοῖς ἀνδρες ἀναριθμητοὶ | εἰς ἄκρον, ὥσπερ ἱστίον, τὸν ἱστὸν*. Archippos, *asini umbra*, Fr. 1, *τροχιλίσαι ταῦτα καὶ τοπελοῖς | ἱστάσω οὐκ ἀνευ πότου*. Both quoted by Harpocration, s.v. *τοπεῖον*. The plays were produced at Athens about 400 B.C.: so this popular usage of the term *τοπεῖα* was concurrent with the technical usage. Assuming that the *καλωδία* and *πόδες* and *ὑπέραι* were brailing-ropes and sheets and braces, the *ἱμάντες* and *ἀγκοῖνα* and *χαλιὼς* would naturally be halyards and fore-stay and back-stay. The halyards are termed *ἱμάντες* by Apollonios Rhodios, iv. 889, 890, *ὅψι δὲ λαΐφος | ἐρυσσαν τανύσαντες ἐν ἱμάντεσσι κεραλῆς*, this *τανύσαντες ἐν* representing *ἐντανύσαντες*. cf. Heliodoros, *Æthiopica*, v. 27, *τὰ ἱστία ἀνιμώντων*. The *ἀγκοῖνα* or *anquina* is mentioned by Cinna, apud Isidorum, xix. 4. 7, *atque*

eighteen loops of brailing-ropes—six ropes with three loops each, two halyards, a double fore-stay, two sheets, two braces, and a back-stay<sup>180</sup>. The inventories also shew that the three-banked ships were rigged differently some years before. There were then the *histos megas* and the *keraiiai megalai* or large-mast and large-yard, and the *histos akateios* and the *keraiiai akateioi* or boat-mast and boat-yard: there were also two timber *parastatai*, which probably were a pair of posts arranged as bitt-heads to support the foot of a mast that could easily be raised and lowered: and although four of the six sorts of ropes were the same, there were then *kaloi* instead of loops of *kalodia* and the *agkoïna* was not double<sup>181</sup>. But whilst

*anquina regat stabilem fortissima cursum*, and by Lucilius, apud Nonium, p. 536, *funis enim præcisus cito adque anquina soluta*. But here *anquina* should be read *ancyræ*, the line meaning that the shore-cable was cut, and the anchor weighed: see note 166 on p. 73 for similar passages. Cinna's expression *anquina fortissima* might well denote the fore-stay, as that came to be the principal rope in the rigging: see note 202 on p. 94. The term *χαλινός* would thus remain for the back-stay, and seems suitable enough.

<sup>181</sup> Corp. Inscr. Attic. vol. ii, no. 795, col. d, ll. 31—42, κεφάλαιον παραστατῶν ἐπὶ ναὺς Π|||, κεφάλαιον ἱστῶν μεγάλων ΔΔ [...], κεφάλαιον κεραιῶν μεγάλων ἐπὶ ναὺς ΔΔΠ|, κεφάλαιον ἱστῶν [ἀκα]τείων Π||, κεφάλαιον [κερ]αιῶν ἀκατείων ἐπὶ ναὺς [...]. This forms part of a list of the gear for the three-banked ships in one division of the fleet in or about 352 B.C. Corp. Inscr. Attic. vol. ii, no. 794, col. b, ll. 1—10=no. 793, col. a, ll. 38—52, παραστατῶν ἀριθμὸς ΗΗΗΗΠ|||· οὗτοι γίγνονται ἐπὶ ναὺς ΗΗΔΔ|||, [ἱστῶν μεγ]άλων ἀριθμὸς ἐπὶ ναὺς [...] ΔΔΔΠ, [κερ]αιῶν [μεγά]λων ἀριθμὸς ΗΗΗΗΠ|[Δ]|· αὗται γίγνονται ἐπὶ ναὺς ΗΗΔΔΔ|, [ἱστῶ]ν ἀκατείων ἀριθμὸς [ἐπὶ ναὺς...] ΔΔΔΔ||, [κεραιῶ]ν ἀκατεί[ων] ἀριθμὸς [s ΗΠ] ΔΠ||· αὗται γίγνον[ται] ἐπὶ ναὺς Π|ΔΔΔ||| [καὶ μία] κεραία. no. 794, col. b, ll. 15—21=no. 793, col. a, ll. 61—65, [ἱστῶν ἀριθμὸς [ἐπὶ] ναὺς Π|ΔΔΔΔΠ||, [τοπει]ων ἀριθμὸς ἐπὶ ναὺς [ἐντ]ελῇ Π|ΔΔΔΠ||| [καὶ] ἰμάντες ||, πῶδες ||, ὑπέραι |||, ἀγκοῖνα |, [χ]αλινός |, κάλως Π|||. This forms part of a list of the gear for all the three-banked ships in the fleet in or about 356 B.C. Such lists, however, can only shew that masts of two kinds and yards of two kinds were in use concurrently—not that there was a mast and yard of each kind on every three-banked ship; for obviously these ships might not all be rigged alike, but some with a large mast and yard, and some with an akatian. But various entries in the inventories shew incidentally that the ships carried a mast and yard of each kind. Corp. Inscr. Attic. vol. ii, no. 791, l. 92, ἱστ μεγ and ἱστ ἀκ wanted for the Δελφνία, no. 794,

f 2.

there were two kinds of masts and yards, there certainly was only one kind of rope of each sort and only one kind of sail: and the inscriptions give no hint that there was ever more than one set of ropes and one sail for a ship. Xenophon, however, mentions the two kinds of sails, *megala* and *akateia*, in speaking of Athenian three-banked ships in 373 B.C.: and both kinds might have continued in use for about sixteen years longer without appearing in the extant fragments of the inventories<sup>188</sup>. Still, the fact remains that the second mast and yard and the *parastatai* were retained in the Athenian navy for some years after the second sail and the second set of ropes had been discarded: and this is a curious

col. a, ll. 18—20, 27—29, *ker meg* and *lot ak* ready for the *Εὐπρεπής*, col. d, ll. 66—68, *lot meg*, *ker meg*, *lot ak*, *ker ak*, all lost by the *Ταχεῖα*, no. 708, col. b, ll. 16, 17, 26, *lot meg*, *ker meg* and *lot ak* now on board the *Μεγίστη*, ll. 31, 32, *lot meg* and *lot ak* now on board the *Σφενδόνη*, no. 800, col. b, ll. 57, 58, *lot meg* and *lot ak* now on board the *Ἡγεμονία*, no. 801, col. b, ll. 19, 20, *ker meg* and *ker ak* now on board the *Μακαρία*, no. 803, col. b, ll. 53—55, *lot meg*, *ker meg* and *lot ak* lost by the *Τρυφώσα*, col. c, ll. 62—64, *lot meg*, *lot ak* and *ker ak* lost by the *Δωρίς*, ll. 87—90, *lot meg*, *ker meg*, *lot ak*, *ker ak* all lost by the *Τύλεια*: and so forth. There is clearly an error in the second of the lists above, where 454 *παραστάται* are allotted to 224 ships: the mason has put |||| for ||| by repetition, the ships really numbering 227, each with two *παραστάται*. By some chance the *Νίκη* and the *Ἐλευθερία* once had three *παραστάται* on board, according to the entries in the inventories, no. 789, col. b, l. 3, no. 793, col. c, l. 22. But no other ships are credited with more than two; and the entries here may possibly be wrong. The *παραστάται* were certainly of timber, for in the inventories they are reckoned among the *σκεύη ξύλινα*: and as they were discarded simultaneously with the masts and yards described as *μεγάλοι* and *ἀκατεῖαι*, they probably had some connexion with one or other of those masts or yards. Their name indicates that they were a pair of supports for something standing between them; and such supports could not well be attached to a yard, or to any part of a mast except its foot. Most likely they were a pair of posts, to serve as bitt-heads, with the foot of a mast fixed on a pivot between them in such a way that this mast could easily be raised or lowered; for the Athenian three-banked ships then had masts of that description. Xenophon, *Hellenica*, vi. 2. 29, *φυλάκας γε μὴν, τὰς μὲν ἐν τῇ γῇ (ὥσπερ προσήκει) καθίστη, ἐν δὲ ταῖς ναυσὶν αἰρόμενος ἀπὸ τοῦτος ἀπὸ τούτων ἐσκοπεῖτο*. It is clear that there was only one *ιστόριον* and one set of *τοπεῖα* for each ship, since the phrase is *ἐπὶ ναὺς* in the second of the lists above, where the phrase would have been *ταῦτα γίνεταί ἐπὶ ναὺς*, had there been more than one. Unless there was more than one *ἀγκοῖνα* in a set of *τοπεῖα*, there must have been more than eight *κάλως*, for otherwise these *τοπεῖα* would have sufficed for ninety ships with one *ὑπέρα* to spare. But possibly there were two *ἀγκοῖναι* in place of the *ἀγκοῖνα διπλῇ* of later date.

fact. The extant fragments of the inventories do not mention thirty-oared war-ships until 330 B.C.: and then mention them so seldom that there are no parallel passages for correcting errors and omissions. But apparently these ships had a mast that could be raised and lowered; a pair of *parastatai* to support its foot; a yard formed of two spars; a sail; and the same six sorts of ropes, except that there were *kalodia* and not *kaloi*, and that the *agkoïna* was not double<sup>188</sup>. The inventories shew clearly that all ships of the same rate in the Athenian navy were rigged in exactly the same way; and that their masts, yards, sails, etc., were interchangeable.

<sup>188</sup> Xenophon, *Hellenica*, vi. 2. 27, ὁ δὲ Ἴφικράτης ἐπεὶ ἤρξατο τοῦ περιπλοῦ, ἅμα μὲν ἐπλεῖ, ἅμα δὲ πάντα ὅσα εἰς ναυμαχίαν παρεσκευάζετο· εὐθὺς μὲν γὰρ τὰ μεγάλα ἱστία αὐτοῦ κατέλιπεν, ὡς ἐπὶ ναυμαχίαν πλέων· καὶ τοῖς ἀκατείαις δέ, καὶ εἰ εὐφορον πνεῦμα εἴη, ὀλίγα ἐχρήτο· τῇ δὲ κώπῃ τὸν πλοῦν ποιοῦμενος ἀμεινὼν τε τὰ σώματα ἔχειν τοὺς ἄνδρας καὶ ἀμεινὼν τὰς ναὺς πλεῖν ἐποίει. This was in the spring of 373 B.C. The earliest fragments of the inventories in the Corp. Inscr. Attic. are no. 789, assigned to 373/2, and no. 789. b (appendix), assigned to 374/3: but there are no entries about sails until nos. 793 and 794, which are quoted in the last note. The large sails are mentioned again by Xenophon, *Hellenica*, i. 1. 13, Ἀλκιβιάδης δέ, εἰπὼν καὶ τούτοις διώκειν αὐτὸν ἐξελομένοις τὰ μεγάλα ἱστία, αὐτὸς ἐπλευσεν εἰς Πάριον, cf. 12, ἀνάγεσθαι ἤδη αὐτοῦ μέλλοντος ὡς ἐπὶ ναυμαχίαν. ii. 1. 29, Κόνων δέ, κατασχὼν ἐπὶ τὴν Ἀβαρνίδα τὴν Δαμψάκου ἄκραν, ἔλαβεν αὐτόθεν τὰ μεγάλα τῶν Λυσάνδρου νεῶν ἱστία. These events were in 410 and 405 B.C. See also Epicrates, apud Athenæum, xi. 23, κατὰβαλλε τάκατεια, καὶ κυλίκια | αἶρου τὰ μείζω. This dates from about 375 B.C. There is an allusion here to hoisting and lowering the large sails and the akatians, and also an allusion to taking up and putting down the drinking-cups known as κυλίκια and ἀκάτεια. The κυλίκια were shaped like saucers, and could therefore be compared to a sail swelling out before the wind.

<sup>189</sup> Corp. Inscr. Attic. vol. ii, no. 812, col. a, ll. 6—11, τριακοντόρου Ξενοκλῆς Δεκελ(εὐς) σκευὴ ἔχει ξύλινα· ταρβόμ, πηδάλια, κλιμακίδας, κοντούς, ἱστούς, κεραίας, παραστάτας δύο· ἀπὸ τῆς Νίκης, Χαιρεστράτου ἔργον. This thirty-oared *Nίκη* is not to be confounded with the three-banked *Nίκη* mentioned in note 181 on p. 84. The mason has probably put ἱστούς for ἱστών by mistake: he would easily be misled by the neighbouring plurals, and especially by κοντούς just before. A little thirty-oared ship was not very likely to be carrying two masts at a time when large ships of three and four banks were carrying only one; nor was any ship likely to carry two masts of the same kind—the masts would naturally differ in size and bear different names. The δύο after παραστάτας appears to be redundant. Corp. Inscr. Attic. vol. ii, no. 809, col. a, ll. 115, 116, καὶ ἱστίον τρι[ακον]τόρου ἐποησάμε[θα], no. 807, col. c, ll. 42—45, καὶ τριακοντέρον, καλῶδια ἀδόκιμα ΔΔΔΔ, πόδες ||, ὑπέρα |, ἀγκοῖνα, ἱμάντες ||.



At the time when akatian masts and sails were carried on the three-banked war-ships, the large sails used to be sent ashore whenever the ships were cleared for action<sup>184</sup>. Battles being fought without regard to wind, no ship could ever hoist a sail until she had abandoned all attempts at fighting and was trying to get away; and as the large sail had been sent ashore beforehand, she had then to hoist the akatian: so that 'hoisting the akatian' became a proverbial expression for running away. This expression occurs in a play by Aristophanes that was produced in 411 B.C.: and a century afterwards it was adopted by Epicurus in a saying that is quoted by Plutarch and parodied by Lucian<sup>185</sup>. The classic name *akateion* is also applied by Lucian to one of the sails on the merchant-ships of his own times: but apparently the name does not occur again in ancient literature<sup>186</sup>. Most probably, therefore, these masts and sails went out of use soon after they were discarded in the Athenian navy.

<sup>184</sup> Xenophon, *Hellenica*, i. 1. 13, ii. 1. 29, vi. 2. 27, already quoted in note 182. Thucydides also alludes to this practice of sending the large sails ashore before going into action, though he does not give these sails their name: vii. 24, *καὶ χρήματα πολλὰ τὰ ξύμπαντα ἑάλω* 'ἅτε γὰρ ταμείῳ χρωμένων τῶν Ἀθηναίων τοῖς τείχεσι πολλὰ μὲν ἐμπόρων χρήματα καὶ σίτος ἐνῆν, πολλὰ δὲ καὶ τριηράρχων, ἐπεὶ καὶ ἱστία τεσσαράκοντα τριήρων καὶ τᾶλλα σκεύη ἐγκατελήφθη, viii. 43, οἱ δὲ Ἀθηναῖοι ταῖς ἐκ τῆς Σάμου ναυσὶ πάσαις, ὡς ἦσθοντο τὰ τῆς ναυμαχίας, πλεύσαντες ἐς τὴν Σύμην...λαβόντες δὲ τὰ ἐν τῇ Σύμῃ σκεύη τῶν νεῶν, ἀπέπλευσαν ἐς τὴν Σάμον. These events were in 413 and 411 B.C.

<sup>185</sup> Aristophanes, *Lysistrata*, 61—64, A. οὐδ' ἄς προσεδόκων κάλογιζόμεν ἐγὼ | πρῶτας παρέσεσθαι δεῦρο τὰς Ἀχαρνέων | γυναῖκας, οὐχ ἤκουσιν. K. ἡ γοῦν Θεογένους, | ὡς δεῦρ' ἰούσα, τὰκάτειον ἤρετο. Plutarch, *de audiendis poetis*, 1, πότερον οὖν τῶν νεῶν, ὥσπερ τῶν Ἰθακησίων, κηρῷ τινὶ τὰ ὕδα καὶ ἀτέγκτω κηρῷ καταπλάσσοντες ἀναγκάζωμεν αὐτοὺς, τὸ Ἐπικούρειον ἀκάτειον ἀραμένους, ποιητικὴν φεῖγειν καὶ παρεξελάνειν; non posse suaviter vivi secundum Epicurum, 12, ἐπαράμενους τὰ ἀκάτεια φεῖγειν ἀπ' αὐτῶν κελεύουσι, sc. οἱ Ἐπικούρειοι. Lucian, *quomodo historia conscribenda sit*, 45, δεήσει γὰρ τότε ποιητικοῦ τινος ἀνέμου ἐπουριάσσοντος τὰ ἀκάτεια καὶ συνδιοίσοντος ὑψηλὴν καὶ ἐπ' ἄκρων τῶν κυμάτων τὴν ναυὸν.

<sup>186</sup> Lucian, *Lexiphanes*, 15, ἀλλὰ σὺ τὸ δμοιον εἰργάσω με ὥσπερ εἴ τις ὀλκάδα τριάρμενον ἐν οὐρίῳ πλέουσιν, ἐμπεπνευματωμένου τοῦ ἀκατέλου, εὐφοροῦσάν τε καὶ ἀκροκυμάτουσαν, ἑκτοράς τινας ἀμφιστόμους καὶ ἰσχυράδας σιδηρὰς ἀφελὶ καὶ ναυσιπέδας, ἀναχατίζου τοῦ δρόμου τὸ ρόδιον φθόνῳ τῆς εὐνημέας. cf. *Jupiter tragicædus*, 46, οὐκουν ἔφερε μὲν ὑμᾶς τότε ἀνεμος ἐμπύτων τῇ ὁδῷ καὶ ἐμπύλλας τὰ ἀκάτεια, ἧ οἱ ἐρέττωτες, ἐκυβέρνα δὲ εἰς τις ἐφεστῶς καὶ ἔσωζε τὴν ναυὸν;

A mast termed *dolon*, with a sail of the same name, subsequently served for manœuvring before an action and for escaping after a defeat. According to Polybios, the Rhodian war-ships used dolons in an action in 201 B.C.: and he had read the admiral's despatch at Rhodes. And according to Livy, the Syrian and Roman war-ships also used them in actions in 191 and 190 B.C.: and he is here following the lost narrative by Polybios, who probably got his information about these actions from the Rhodian despatches<sup>187</sup>. Diodoros says that the Carthaginian war-ships used them in an action in 307 B.C.: but perhaps he is misquoting his authorities, for at that date the ships might have used akatians<sup>188</sup>. The dolons are mentioned again by Procopios in speaking of Byzantine war-ships in 533 A.D.; and he describes them as the little sails and distinguishes them from the large sails. The name must have been obsolete for centuries, and then resuscitated as a classic term for the smaller sort of mast or sail<sup>189</sup>.

<sup>187</sup> Polybios, xvi. 15, ἐν τῇ περὶ Λάδην ναυμαχίᾳ δύο μὲν αὐτάνδρους πεντήρεις τῶν Ῥοδίων ὑποχείριους γενέσθαι τοῖς πολεμίοις· ἐκ δὲ τοῦ κινδύνου μιᾶς νηὸς ἐπαρμένης τὸν δόλωνα διὰ τὸ τετρωμένην αὐτὴν θαλαττοῦσθαι· πολλοὺς καὶ τῶν ἐγγύς τὸ παραπλήσιον ποιούντας ἀποχωρεῖν πρὸς τὸ πέλαγος· τέλος δὲ μετ' ὀλίγων καταλειφθέντα τὸν ναύαρχον ἀναγκασθῆναι ταῦτ' οἱς προειρημένους πράττειν.....τῆς ἐπιστολῆς ἔτι μενούσης ἐν τῷ πρυτανεῖν, τῆς ὑπ' αὐτοὺς τοὺς καιροὺς ὑπὸ τοῦ ναυάρχου πεμφθείσης περὶ τούτων τῇ τε βουλῇ καὶ τοῖς πρυτάνεσιν. Livy, xxxvi. 44, *quod ubi vidit Romanus, vela contrahit malosque inclinat, et, simul armamenta componens, opperitur insequentes naves. iam ferme triginta in fronte erant; quibus ut aequaret laevum cornu, dolonibus erectis altum petere intendit.* 45, *neque ita multo post primum ab laevo cornu fuga cepit. Polyxenidas enim ut virtute militum laud dubie se superari vidit, sublatis dolonibus effuse fugere intendit.* xxxvii. 30, *ceterum postquam alias circumventas, pratoriam navem Polyxenida relictis socii vela dantem videre, sublatis raptim dolonibus, Ephesum petunt fuga.*

<sup>188</sup> Diodoros, xx. 61, ὁ δὲ τῶν Καρχηδονίων στρατηγός, ἀλίσκομένης ἤδη τῆς ναυαρχίδος, ἀπέσφαξεν αὐτὸν, προκρίνας τὸν θάνατον τῆς προσδοκηθείσης αἰχμαλωσίας. οὐ μὴν ἐφάνη γε εὐ βεβουλευμένος· ἡ γὰρ ναὺς φοροῦ πνεύματος ἐπιλαβομένη, τοῦ δόλωνος ἀρθέντος, ἐξέφυγε τὸν κίνδυνον.

<sup>189</sup> Procopios, de bello Vandalico, i. 17, τοῖς δὲ ναύταις ἐπήγγελλε παρακολουθεῖν τε αἰεὶ καὶ τοῦ στρατεύματος μὴ πολὺ διεστάναι, ἀλλ' ἐπιφόρου μὲν γινομένου τοῦ πνεύματος χαλάσαντας τὰ μεγάλα ἱστία τοῖς μικροῖς, ἃ δὴ δόλωνας καλοῦσιν, ἔπεσθαι· λωφῆσαντος δὲ παντελῶς τοῦ ἀνέμου βιάζεσθαι ὅσον οἱ τοι τε ὥσιν ἐρέσσοντας. This is clearly an adaptation of the passage in Xenophon, Hellenica, vi. 2. 27, already quoted in note 182 on p. 85.

A mast and sail termed *artemon* are mentioned by Lucilius a little before 100 B.C., and then by Labeo and the elder Seneca, who treat them as subordinate to the ordinary mast and sail<sup>190</sup>. In later times the *artemon* is mentioned by name in the Acts of the Apostles and also by Paulinus of Nola about 400 A.D.; while a subordinate sail is noticed by Juvenal and afterwards by Synesios, a contemporary of Paulinus<sup>191</sup>. These statements may all refer to merchant-ships: but a small sail is mentioned by Appian in narrating how some Roman war-ships got away after a defeat off Mylæ in 36 B.C., though unfortunately he does not give the sail a name<sup>192</sup>.

Thus a second mast of some sort, *artemon* or *dolon* or *akatian*, was generally in use from 411 B.C. to 533 A.D. and perhaps before and after: but there is not anything to shew what difference there was between the *akatian* and the *dolon*, or the *dolon* and the *artemon*.

<sup>190</sup> Lucilius, apud Charisium, p. 99, *Arabus artemo*. Lucilius died about 100 B.C. The Pandects, l. 16. 242, *malum navis esse partem, artemonem autem non esse, Labeo ait: quia pleræque naves sine malo inutiles essent, ideoque pars navis habetur; artemo autem magis adiectamento quam pars navis est*. Seneca, controversiæ, vii. 1. 2, *ubi spes? in gubernaculo? nulla est. in remigio? ne in hoc quidem est. in comite? nemo repertus est naufragi comes. in velo? in artemone? omnia pæne instrumenta circumscisa sunt: adminiculum spei nullum est*. There is an emendation here, *artemone* for *arte*; and if that is right, Seneca distinguishes the ordinary sail (*velum*) from a sail termed *artemo*, just as Labeo distinguishes the ordinary mast (*malus*) from a mast termed *artemo*. Labeo and Seneca were both living at Rome in the reign of Augustus.

<sup>191</sup> Acts, xxvii. 40, *ἐπάραντες τὸν ἀρτέμωνα τῇ πνεύσει, κατεῖχον εἰς τὸν ἀγκυλόν*. Paulinus Nolanus, epistolæ, 49. 2, *malus ita prosiliviit a vulnere, ut longe extra navem in undas expulsus tuto ceciderit. deinde, cum aut artemone armari oportebat, aut sentinam depleri, etc.* Juvenal, xii. 67—69, *inopi miserabilis arte cucurrit | vestibis extensis, et, quod superaverat unum, | velo prora suo*. cf. 53—55, *tunc, adversis urgentibus, illuc | recidit, ut malum ferro submitteret, ac se | explicat angustum*. Synesios, epistolæ, p. 163 D, *ὑπαλλάττειν μὲν οὖν ἱστίον ἕτερον νόθον οὐκ εἶχομεν, ἡνεχυράστο γάρ' ἀνελαμβάνομεν δὲ αὐτὸ καθάπερ τῶν χιτῶνων τοὺς κόλπους*. This can only mean that they reduced the size of the ordinary sail until it would fit a smaller mast and yard. For *χιτῶνων κόλπους*, cf. Herodotos, vi. 125. 2, 3; Polybios, iii. 33. 2; Æschylos, septem adversus Thebas, 1039. Paulinus died in 431 A.D., and Synesios a year or two before.

<sup>192</sup> Appian, de bellis civilibus, v. 111, *ἀλίσκομένων δὲ καὶ πιμπραμένων τῶν Καίσαρος νεῶν, αἱ μὲν ἀράμεναι τὰ βραχέα τῶν ἱστίων ἀπέπλεον εἰς τὴν Ἰταλίαν, τῶν παραγγελμάτων καταφρονεῖσαι κ.τ.λ.*

The artemon must have been something between a foremast and a bowsprit with a spritsail on a spritsail-yard; for that is what is represented on the coins of 67 and 186 and 305 A.D. in fgs. 27 and 28 and 34, and in the reliefs and paintings of corresponding date in fgs. 26, 29, 31, 33, 35, 37 and 40. On the Roman war-ship of about 50 A.D. in fg. 35 there is not any mast beside the artemon; but the ship is here in action, and obviously the ordinary mast and sail have been taken down or sent ashore beforehand. The rule was still to send the ordinary sail ashore when a ship was cleared for action; and the ordinary mast must always have been lowered in a battle, for otherwise it would have snapped under the shock of ramming<sup>193</sup>.

A third mast had come into use by about 50 A.D.; and this was presumably a mizen<sup>194</sup>. Perhaps a few of the largest merchant-ships were fitted with this mast; but normally there were only two.

<sup>193</sup> Plutarch, Antonius, 64, καὶ τοὺς κυβερνήτας τὰ ἱστία βουλομένους ἀπολιπεῖν ἠνάγκασεν ('Antonius) ἐμβαλέσθαι καὶ κομίζειν. 66, ἀκρίτου δὲ καὶ κοινῆς ἔτι τῆς ναυμαχίας συνεστώσης, αἰφνιδίον αἱ Κλεοπάτρας ἐξήκοντα νῆες ὥφθησαν αἰρόμεναι πρὸς ἀπὸπλουν τὰ ἱστία καὶ διὰ μέσου φεύγουσαι τῶν μαχομένων. Dion Cassius, l. 33, τοὺς γὰρ φεύγοντας, αἶτε καὶ ἀνευ ἱστίων ὄντες καὶ πρὸς τὴν ναυμαχίαν μόνην παρεσκευασμένοι, οὐκ ἐπεδίωξαν. These passages refer to the battle of Actium in 31 B.C.; and certainly imply that it then was customary to send the ordinary sail ashore on clearing for action. See also Livy, xxvi. 39, *velis tum forte, improvidus futuri certaminis, Romanus veniebat*, and Vegetius, iv. 43, *navalis pugna tranquillo committitur mari, liburnarumque moles non ventorum flatibus sed remorum pulsu adversarios percutit rostris*. For the lowering of the masts, see Polybios, i. 61, οἱ δὲ Καρχηδόνιοι, κατιδόντες τὸν διάπλουν αὐτῶν προκατέχοντας τοὺς Ῥωμαίους, καθελόμενοι τοὺς ἱστούς, κ.τ.λ., and Livy, xxxvi. 44, *quod ubi vidit Romanus, vela contrahit malosque inclinat*.

<sup>194</sup> Athenæos, v. 43, τριῶν τε ἱστίων ὑπαρχόντων, ... τῶν δὲ ἱστίων ὁ μὲν δεύτερος καὶ τρίτος εὐρέθησαν· δυσχερῶς δὲ ὁ πρῶτος ἐν τοῖς ὄρεσι τῆς Ἰππερίας εὐρέθη ὑπὸ συβώτου ἀνδρός. Pliny, xix. 1, *iam vero nec vela satis esse maiora navigiis. sed cum vix amplitudini antennarum singula arbores sufficient, super eas tamen addi velorum alia vela, præterque alia in proris et alia in puppidis pandi*. Pliny speaks as though a three-masted ship were a thing of recent date; and Athenæos may really be describing a ship of Caligula's time or afterwards, though professing to describe a ship belonging to Hieron: see pp. 27—29. There is possibly an allusion to the three masts of a ship in the Corinthian jest recorded by Strabo, viii. 6. 20. As many as fifty masts and sails were carried on the biggest timber-rafts: see Theophrastus, *historia plantarum*, v. 8. 2, quoted in the note on *raies* on p. 122.

A topsail had also come into use by about 50 A.D. as part of the ordinary rig<sup>195</sup>. The ancients always knew that they improved the pace of a ship by carrying sail as high as possible, though apparently they did not understand the cause of this; but hitherto they had gained their object by hoisting up the yard<sup>196</sup>. Now they introduced a sail that was triangular in form, and spread it with its base along the yard and its apex at the top of the mast, as depicted on the Roman ship of about 200 A.D. in fig. 29, and less distinctly on those in figs. 27, 32, and 39. The topsail being of this shape, no topsail-yard was needed; nor can such a yard be detected in the manuscript of about 500 A.D. in fig. 38, for obviously the scribe has combined the masts and yards belonging to both lines of ships in a convenient group above the upper line, simply to avoid confusion.

<sup>195</sup> Seneca, *epistolæ*, 77, *subito nobis hodie Alexandrinæ naves apparuerunt, quæ præmitti solent et nuntiare secutura classis adventum: tabellarias vocant. gratus illarum Campaniæ aspectus est. omnis in pilis Puteolorum turba consistit et ex ipso genere velorum Alexandrinas quamvis in magna turba navium intellegit. solis enim licet supparum intendere, quod in alto omnes habent naves. (nulla enim res æque adiuvat cursum quam summa pars veli: illinc maxime navis urgetur. itaque quotiens ventus increbruit maiorque est quam expedit, antenna submittitur: minus habet virium flatus ex humili.) cum intravere Capreas et promontorium ex quo "alta procelloso speculatur vertice Pallas," cetera velo iubentur esse contenta: supparum Alexandrinarum insigne est. cf. Seneca, *Medea*, 323—328, *nunc antennis medio tutas | ponere malo; nunc in summo | religare loco, cum iam totos | avidus nimium navita flatus | optat, et alto rubicunda tremunt | suppara velo*. Lucan, v. 428, 429, *summaque pandens | suppara velorum perituras colligit auras*. Statius, *silvæ*, iii. 2. 27, *summis annectite suppara velis*. The top-sail is noticed by Pliny in the passage quoted in the last note, but he omits the name. Apparently *supparum* becomes σιφάρος in Greek. Epictetus, *dissertationes*, iii. 2. 18, βυθίζομένου δὲ τοῦ πλοίου, σὺ μοι παρελθὼν ἐπαίρεις τοὺς σιφάρους. But possibly σιφάρους is here a corruption of σειραφόρους, the regular equivalent of *supparum* being παράσειρον. Lucian, *navigium*, 5, ὁ μὲν γὰρ ἄλλος κόσμος, αἱ γραφαὶ καὶ τοῦ ἱστίου τὸ παράσειρον πυραυγές, κ.τ.λ. Athenæos, v. 39, ὁ δὲ ἱσθὺς ἦν αὐτῆς ἐβδόμη-κοντα πηχῶν, βύσσων ἔχων ἱστίον, ἀλουργεῖ παρασειρῶ κεκοσμημένον. This last passage refers to a vessel built by Ptolemy Philopator for his voyages on the Nile: but Athenæos is quoting from Callixenos, and he must be committing the anachronism of giving this vessel a type of sail that was not introduced until about two hundred years afterwards. The term παράσειρον can only denote a top-sail or a studding-sail; and there is not any trace of the use of studding-sails in ancient times. By their description of these παράσειρα as πυραυγές and ἀλουργές, Lucian and Athenæos confirm Seneca's description of the *suppara* as *rubicunda*.*

Thus a full-rigged ship must now have had a main mast with a yard that carried a square sail below and a triangular sail above, a fore-mast or bowsprit with a yard and square sail only, and also a mizen with perhaps a similar yard and sail. The rigging had been developed to this point by about 50 A.D. at latest; but after that there was not any further progress, and the additional masts and sails were gradually discarded. Thus, while two masts and sails were carried on the Byzantine war-ships that made the attack on Carthage in 533 A.D., only one was carried on those that were equipped for the attack on Crete in 949 A.D. So the arrangement of the rigging as well as the arrangement of the oars had now reverted to the style in vogue among the Greeks some sixteen centuries before<sup>197</sup>.

<sup>196</sup> Aristotle, *mechanica*, 7, διὰ τί, ὅσῳ ἂν ἡ κεφαλὰ ἀνωτέρα ᾗ, θάπτον πλεί τὰ πλοῖα τῷ αὐτῷ ἰστίῳ καὶ τῷ αὐτῷ πνεύματι; ἡ δὲ διότι γίνεται ὁ μὲν ἰστὸς μοχλὸς, ὑπομόχλιον δὲ τὸ ἐδῶλιον ἐν ᾧ ἐμπέπηγεν, ὃ δὲ δεῖ κινεῖν βάρος τὸ πλοῖον, τὸ δὲ κινεῖν τὸ ἐν τῷ ἰστίῳ πνεῦμα; εἰ δ' ὅσῳ ἂν πορρώτερον ᾗ τὸ ὑπομόχλιον, ῥῆον κινεῖ καὶ θάπτον ἡ αὐτὴ δύναμις τὸ αὐτὸ βάρος, ἡ οὖν κεφαλὰ ἀνώτερον ἀγομένη καὶ τὸ ἰστίον πορρώτερον ποιεῖ τοῦ ἐδωλίου ὑπομοχλίου ὄντος. This is copied by Vitruvius, x. 3. 5, *eiusque vela cum sunt per altitudinem mediam mali pendentia, non potest habere navis celerem cursum: cum autem in summo cacumine antennæ subductæ sunt, tunc vehementiori progreditur impetu, quod non proxime calcem mali—quod est loco centri—sed in summo et longius ab eo progressa recipiunt in se vela ventum*. Asclepiades says that the *calx* or πτέρνα was the bottom of the mast, and fitted into the ληνός—see note 199 on p. 92—so ληνός and ἐδῶλιον seem to mean the same thing here. In its action as a lever, the mast could only drive the fore part of the ship deeper into the water as the leverage was increased. The fact is simply that the friction of the wind against the waves retards the lower currents of air more than it retards the currents above; so that, as Seneca says, *minus habet virium flatus ex humili*, *epistolæ*, 77, quoted in the last note.

<sup>197</sup> Porphyrogenitos, de *cærimoniis*, ii. 45, p. 389, ἐδόθη ὑπὲρ ἀγορᾶς τῶν πανίων τῶν βασιακῶν λόγῳ ποιήσεως ἀρμένων θ' ἀνὰ πηχῶν λ' τῶν θ' караβίων τῶν Ῥώς, καὶ ἐτέρων ἀρμένων β' ἀνὰ πηχῶν κή τῶν β' μονερίων τῶν αἰχμαλώτων, σὺν τῶν δοθέντων πανίων βασιακῶν κατὰ περισσειαν τοὺς αὐτοὺς Ῥώς· ὑπὲρ πανίων διὰ τῶν ἀμφοτέρων ἀρνδ'...ἐδόθη ὑπὲρ ἀγορᾶς σχοινίων λόγῳ κρυπτῶν ἐπικήρων καὶ ποδιοδρόμων τῶν αὐτῶν ι' ἀρμένων γ. p. 388, εἰς ἐξόπλισιν τῶν κ' δρομονίων,...ἀρμενα κ'...ἀναγοκατάγοντα σὺν τῶν ἱμανταρίων αὐτῶν κ'. These were the largest dromons then in use: see note 47 on p. 19. The ἀρμενα are here the sails; and apparently the ἱμαντάρια and ἀναγοκατάγοντα are the halyards and their blocks. The sheets and braces may be included in the phrase κρυπτῶν ἐπικήρων καὶ ποδιοδρόμων under names akin to πόδες and ἐπικρία. See pp. 18, 19 as to the oars in use at this period; and p. 87 with note 189 as to the masts and sails in use in 533 A.D.

The mast was fitted with a military-top on the largest of these Byzantine war-ships, so that the men could shoot down missiles upon an enemy's deck<sup>190</sup>. And military-tops are represented on the masts of the Egyptian and Asiatic war-ships two thousand years before, as in fgs. 6 to 8. But on the Greek and Roman war-ships the masts were lowered during an engagement; and military-tops were consequently left to merchant-ships, the larger vessels of that class carrying them as part of their defence against the pirates. In these times the top was somewhat like a tub or cask, with space enough for two or three men to stand inside; and this was fastened round the mast a little way above

<sup>190</sup> Leo, *tactica*, xix. 7, ἀλλὰ καὶ τὰ λεγόμενα ξυλόκαστρα περὶ τὸ μέσον που τοῦ καταρτίου ἐν τοῖς μεγίστοις δρόμωσιν ἐπιστήσουσι περιτετευχισμένα σανίσιν, ἐξ ὧν ἄνδρες τινὲς τὸ μέσον τῆς πολεμίας νηὸς ἀκοντίσουσιν ἢ λίθους μυλικοῦς ἢ σιδηρά βαρέα, ὅσον μάζας ξιφοειδεῖς, δι' ὧν ἡ τῆν ναῦν διαθρύψουσιν ἢ τοὺς ὑποκειμένους συνθλάσουσιν σφοδρῶς καταφερόμενα, ἢ τι ἕτερον ἐπιχύσουσιν ἢ ἐμπρῆσαι δυνάμενον τὴν ναῦν τῶν ἐναντίων ἢ τοὺς ἐν αὐτῇ πολεμίους θανατώσαι.

<sup>190</sup> Athenæos, xi. 49, *καρχήσιον*. Καλλιξένος δ' Ῥόδιος ἐν τοῖς Περὶ Ἀλεξανδρείας φησὶν ὅτι ποτήριον ἐστὶν ἐπίμυκες, συνηγμένον εἰς μέσον ἐπικεικῶς, ὅτα ἔχον μέχρι τοῦ πυθμένος κατήκοντα. . . Ἀσκληπιάδης δ' ὁ Μυρλεανὸς κεκληθῆσθαι φησὶν αὐτὸ ἀπὸ τινος τῶν ἐν τῇ νηὶ κατασκευασμάτων. τοῦ γὰρ ἰσοῦ τοῦ μὲν κατωτάτω πτέρνα καλεῖται, ἡ ἐμπίπτει εἰς τὸν ληνόν· τὸ δ' ὅλον εἰς μέσον, τράχηλος· τὸ δὲ πρὸς τῷ τέλει καρχήσιον. ἔχει δὲ τοῦτο κεραίαις ἄνω συννεούσας ἐφ' ἐκάτερα τὰ μέρη, καὶ ἐπικείται τὸ λεγόμενον αὐτῷ θωράκιον, τετράγωνον πάντῃ πλήν τῆς βάσεως καὶ τῆς κορυφῆς· αὐταὶ δὲ προὔχουσιν μικρὸν ἐπ' εὐθείας ἐξωτέρω. ἐπὶ δὲ τοῦ θωρακίου εἰς ὕψος ἀνήκουσα καὶ ἐξεία γιγνομένη ἐστὶν ἡ λεγομένη ἡλακότη. There is clearly a misreading here, ἐπικείται for ἔγκειται. Callixenos says that the wine-cup καρχήσιον contracted a little in the middle and had handles reaching down to the bottom, so Asclepiades must have said that the mast-head καρχήσιον consisted of a θωράκιον bulging a little at the top and bottom, with a pair of κεραίαι curving up on either side. These κεραίαι were presumably the hooks that carried the halyards: they could not be the yards, as those were straight. For the phrase τετράγωνον πάντῃ, cf. Corp. Inscr. Attic. vol. ii, no. 835, l. 70, κύλινδρος τετράγωνος πανταχοῦ. Thus its meaning is simply that there were not any projections or depressions in the sides of the θωράκιον between the two projections at the top and bottom. Athenæos, v. 43, τριῶν τε ἰσῶν ὑπαρχόντων, . . . ἦσαν δὲ κατὰ τοὺς ἰστούς ἐν τοῖς καρχησίοις, οὓσι χαλκοῖς, ἐπὶ μὲν τοῦ πρώτου τρεῖς ἄνδρες, εἰθ' ἐξῆς καθ' ἓνα λειπόμενοι· τούτοις δ' ἐν πλεκτοῖς γυργάθοις διὰ τροχιλίων εἰς τὰ θωράκια λίθοι παρεβάλλοντο καὶ βέλη διὰ τῶν παίδων. cf. 44, ἄστρον γὰρ ψαύει καρχήσια, καὶ τριελίκτους θώρακας μεγάλων ἐντὸς ἔχει νεφέων. In the inventories of the Athenian dock-yards an ἐπίθημα θωρακείου is mentioned as something belonging to a war-ship: see Corp. Inscr. Attic. vol. ii, no. 791, l. 31. But there is nothing to shew that this θωράκειον was part of a military-top.

the yard, the halyards working through a pair of hooks or rings which projected from its sides and served as blocks<sup>199</sup>. In the absence of a military-top these hooks or rings projected from the mast itself, as in fig. 13, where they crown the mast, or again in fig. 30, where the mast extends beyond, and forms a kind of topmast for carrying the triangular sail above the yard<sup>200</sup>. On merchant-ships the yards were strong enough for heavy weights to be hoisted to the ends and thence let fall on an assailant. And channels could therefore be defended by mooring merchant-ships at intervals across, and thus sending masses of lead and lumps of rock through the bottoms of any vessels that tried to run through<sup>201</sup>.

<sup>199</sup> Pindar, Nemea, v. 51, ἀνὰ δ' ἰστία τεῖνον πρὸς ζυγὸν καρχασίου. The term ζυγὸν must here denote the pair of hooks for the halyards; and so also *iuga* in Latin. Lucan, ii. 695, *dum iuga curvantur mali*, cf. v. 418, *hic utinam summi curvet carchesia mali*, sc. *Aquilo*. The hooks being known as horns, κεραῖαι—see last note—the καρχῆσιον could be described as the thing with the horns, κεροῦχος or *ceruchus*. Ennodius, carmina, i. 7. 43, *lintea nam summis dum crispant nexa ceruchis*. Valerius Flaccus, i. 469, *temperet ut tremulos Zetes fraterque ceruchos*. Lucan, viii. 177, *instabil summis minor Ursa ceruchis*, x. 494, 495, *et tempore eodem | transtraque nautarum, summique arsere ceruchi*. But while *ceruchus* was thus in use in Latin, κεροῦχος gave place to κεπόλαξ in classical Greek—see note 203 on p. 94—and afterwards to κάροιον, as in Leo, *tactica*, xix. 5. The terms *ceruchus* and *κεπόλαξ* are always in the plural, but *carchesium* and καρχῆσιον vary between the plural and the singular. Plutarch, Themistocles, 12, γλαῦκα δ' ὀφθῆναι τοῖς καρχησίοις ἐπικαθίζουσιν. Lucian, *de mercede conductis*, i, ἦ τιν' ἄλλον ἐκ μηχανῆς θεὸν ἐπὶ τῷ καρχησίῳ καθεζόμενον, cf. *navigium*, 9, *amores*, 6. Apuleius, *metamorphoses*, xi. 16, *insigni carchesio conspicua*, sc. *malus*. Catullus, 64. 235, 236, *candidaque intorti sustollant vela rudentes, | lucida qua splendent summi carchesia mali*. See also Apollonios Rhodios, i. 565, καὶ δ' αὐτοῦ λίνα χεῖρας ἐπ' ἡλακᾶτην ἐρύσαντες, where αὐτοῦ denotes ἱστοῦ. According to Asclepiades, the ἡλακᾶτη was the portion of the mast above the θωράκιον—see last note—so Apollonios can only mean that the yard was hoisted up to the καρχῆσιον at the foot of the ἡλακᾶτη. Apparently, the ἡλακᾶτη was also termed the *στυλῖς*, for three of the stars in the constellation of the Argo are placed ἐπὶ στυλίδος ἄκρας by Eratosthenes, *catasterismi*, 35, and *ad malum* by Hyginus, *astronomia*, ii. 36. Hyginus, however, may be confusing the stars that Ptolemy places πρὸς τῷ ἄκρῳ τοῦ ἱστοῦ and ἐν τῷ ἀκροστόλιῳ, *Almagest*, viii. 1, Ἀργοῦς ἀστερισμός. The ἀκροστόλιον is suggested by the phrase in Plutarch, Pompeius, 24. 2, *στυλίσιν χρυσαῖς*.

<sup>201</sup> Thucydides, vii. 38, διαλείπουσας δὲ τὰς ὀλκάδας ὅσον δύο πλέθρα ἀπ' ἀλλήλων κατέστησεν, ὅπως εἰ τις βιάζοιτο ναῦς, εἴη κατάφευξις ἀσφαλὴς καὶ πάλιν καθ' ἡσυχίαν ἐκπλοῦς. 41, αἱ δὲ τῶν Συρακοσίων νῆες μέχρι μὲν τῶν ὀλκάδων ἐπεδιώκον· ἔπειτ' αὐτοὺς αἱ κεραῖαι ὑπὲρ τῶν ἑσπλων αἱ ἀπὸ τῶν ὀλκάδων δελφινόφοροι ἡρμέναι ἐκώλυνον. Aristophanes, *equites*, 761, 762, ἀλλὰ φυλάττου, καὶ πρὶν ἐκεῖνον προσκίεσθαι σου,



All the ropes in the rigging of a Roman merchant-ship seem to be represented in the reliefs of about 50 A.D. and 200 A.D. in figs. 26 and 29 to 31. The mast is fitted with a set of shrouds, which slope a little aft and thus support it from behind as well as from the sides; while in front it is supported by a single fore-stay. This is a larger rope than any of the others<sup>203</sup>; and seems to be intended for lowering the mast towards the stern and hauling it up again, though on a merchant-ship the mast might well have been a fixture. The yard has two halyards in the middle and several pairs of lifts towards the end; and these lifts carry the topsail. There are braces to the yard; and there are sheets to the sail, and also a number of brailing-ropes. The bowsprit has two

πρότερον σὺ | τοὺς δελφίνας μετεωρίζου καὶ τὴν ἄκατον παραβάλλου: scholia in locum, δηλοῦται δὲ καὶ ὑπὸ Φερεκράτους ἐν τοῖς Ἀγρίοις, ὅταν λέγῃ, ὁ δὲ δὴ δελφίς ἐστὶ μολιβδοῦς, δελφινόφορος τε κέρδος, διακόψει τοῦδαφος αὐτῶν ἐμπίπτων καὶ καταδύων. These verses are corrupt; but some word like κέρας must be involved in κέρδος. Diodoros, xiii. 78, οἱ δ' ἐπὶ τῶν μεγάλων πλοίων ἐφεστῶτες ἐπέβριπτον ταῖς τῶν πολεμίων ναυσὶ τοὺς ἀπὸ τῶν κεραίων λίθους. 79, πλείστοι δ' ὑπὸ τῶν λιθοφόρων κεραίων ἐπιπτον, ὡς ἂν ἐξ ὑπερδεξιῶν τόπων βαλλόντων λίθους ὑπερμεγέθεις τῶν Ἀθηναίων. Athenæos, v. 43, τριῶν τε ἰστίων ὑπαρχόντων, ἐξ ἑκάστου κεραΐαι λιθοφόροι ἐξήρτητο δύο, ἐξ ὧν ἄρπαγές τε καὶ πλινθοὶ μολίζου πρὸς τοὺς ἐπιτιθεμένους ἠφιέντο.

<sup>203</sup> Lucian, *navigium*, 5, ἡλικὸς μὲν ὁ ἰστός, ὅσῃν δὲ ἀνέχει τὴν κεραΐαν, οὗ καὶ προτόνῳ κέχρηται καὶ συνέχεται. cf. *Æschylos*, *Agamemnon*, 897, σωτήρα ναὸς πρότονον. Synesios, *epistolæ*, p. 164 C, τὸ κέρας ἐπετρίγει, καὶ ἡμεῖς ψόμεθα προτονίζειν τὴν ναῦν. εἴτα κατεαγὸς μέσον ἐγγὺς μὲν ἦλθεν ἀπολέσαι πάντας ἡμᾶς, κ.τ.λ. Antipater, in the *Anthology*, x. 2. 7, λαίφεα δ' εὐνφέα προτονίζετε. Synesios uses *προτονίζειν* for tightening the fore-stay to secure the mast, etc.; whereas Antipater uses it for letting the sail out far enough to touch the fore-stay. cf. Oppian, *de piscatione*, i. 227, λίνα πάντα περὶ προτόνοισι μέμκε: Euripides, *Hecuba*, 113, 114, τὰς ποντοπόρους δ' ἔσχε σχεδίας, | λαίφη προτόνοισι ἐπειροδομένας, *Iphigenia in Tauris*, 1134—1136, δέρι δ' ἰστία προτόνοισι κατὰ | πρῶραν ὑπὲρ στόλον ἐκπετάσουσιν, πῶδα | ναὸς ὠκυρόμην; reading *προτόνοισι* in place of *πρότονοι* or *πρότονος*. For *πῶς*, see note 206 ὅν p. 96.

<sup>204</sup> Aristotle, *ethica Eudemia*, iii. 1. 28, οὔτε γὰρ διὰ τὸ εἰδέναι τὰ φοβερά θαρρόουσιν οἱ ἐπὶ τοὺς ἰστούς ἀναβαλνέειν ἐπιστάμενοι, ἀλλ' ὅτι ἴσασι τὰς βοηθείας τῶν δεινῶν. Cicero, *de senectute*, 6, *alii malos scandant*. Euripides, *Hecuba*, 1259—1263, Π. ἀλλ' οὐ τάχ', ἥρ' κ' ἂν σε ποντία νοτίς—Ε. μὴν ναυστολήσῃ γῆς ὄρους Ἑλληνίδος; Π. κρήνη μὲν οὖν πεσοῦσαν ἐκ καρχησίῳ. Ε. πρὸς τοῦ βιαιῶν τυγχάνουσιν ἀλμάτων; Π. αὕτη πρὸς ἰστὸν ναὸς ἀμβήσει ποδί. Lucian, *navigium*, 4, θαυμάζοντες ἀνιόντα τὸν ναῦτην διὰ τῶν κάλων, εἴτα ἐπὶ τῆς κεραίας ἀνω ἀσφαλῶς διαθέοντα τῶν κεραιῶν ἐπειληγμένον, cf. *Jupiter tragædus*, 48, καὶ ἐπὶ τὴν κεραΐαν ἀναπηδῆσαι βῆδιον. Ovid, *metamorphoses*, iii. 615, 616, *quo non alius conscendere*

halyards for the spritsail-yard; and the spritsail and its yard would require sheets and brailing-ropes, braces and lifts. There are not any ratlines to the shrouds: and men had always to go aloft as best they could by climbing up the mast or any rope available<sup>303</sup>.

The brailing-ropes were passed through rings upon the fore-side of the sail, and then through separate pulleys on the yard<sup>304</sup>, as may be seen in fgs. 29 and 30; and from the yard they seem to have been carried to the stern and made fast to pins there, so that the steerer could manage them himself, whereas the larger ropes were attached to various windlasses about the ship and worked by his subordinates<sup>305</sup>. Curiously, the practice was always to brail up half the sail when the

*summas | ocior antennas, prensoque rudente relabi.* Galen, de usu partium, viii. 5, ἀλλὰ καὶ ὅσοι ταῖς κεφαλαῖς τῶν πλοίων ἐπαλῶσι, πρότεροι τὴν γῆν καθορώσι τῶν ἐν τῇ νηὶ πλωτῆρων. In the passages just quoted from Euripides and Lucian the terms *καρχησίων* and *κεροιάκων* appear to be synonymous: see note 200 on p. 93. The terms *κάλωι* and *rudentes* could be applied to ropes of any kind, but generally were reserved for brailing-ropes. Virgil, *Æneid*, x. 229, *velis immitte rudentes*, cf. iii. 267, 682. Lucan, v. 426, 427, *totosque rudentes | laxavere sinus*. Lucian, *amores*, 6, εἰτ' ἀθρόας κατὰ τῶν κάλων τὰς ὀθῶνας ἐκχέαντες. Satyrios Thyillos, in the *Anthology*, x. 5. 6, πᾶν λαΐφος ὕφεσθε κάλωις. See also the passages quoted in note 178 on p. 81.

<sup>304</sup> Synesios, *epistolæ*, p. 163 C, δ δὲ ἐποιεῖ παρὰ πόδας τὸν κίνδυνον, οὐχ ἕτερον ἢν ἄλλ' ὅτι πᾶσι *ιστίοις* ἡ ταῦς ἐφέρετο, ὑποτεμέσθαι δὲ οὐκ ἦν, ἀλλὰ πολλάκις ἐπιχειρήσαντες τοῖς καλῶδίοις ἀπηγορεύεμεν, τῶν τροχῶν ἐνθακόντων, κ.τ.λ. p. 163 D, καὶ ἡ ὁρὸς ἐξισταμένη παρῆχεν ἡμῖν κεχρησθαι τοῖς καλῶδίοις καὶ τὸ *ιστίον* μεταχειρίζεσθαι. p. 164 D, πάλιν δὲ δυσπειθεῖ ἦν τὸ *ιστίον* καὶ οὐκ εὐτροχον εἰς καθαίρεσιν. Synesios employs the phrase *ὅλοις ιστίοις*, p. 160 C, as well as *πᾶσι ιστίοις*, p. 163 C. For the converse, see Aristophanes, *ranæ*, 999, 1000, ἀκροῖσι | χρώμενος τοῖς *ιστίοις*, and Euripides, *Medea*, 524, ἀκροῖσι λαΐφους κρασπέδοις.

<sup>305</sup> Plutarch, *præcepta gerendæ rei publicæ*, 15. 16, ὡς οἱ κυβερνήται τὰ μὲν ταῖς χερσὶ δι' αὐτῶν πράττουσι, τὰ δ' ὀργάνοις ἐτέροις δι' ἐτέρων ἀποθεν καθήμενοι περιάγουσι καὶ στρέφουσι. Lucian, *navigium*, 5, αἱ ἀγκυραὶ καὶ στροφεῖα καὶ περιαγωγεῖς καὶ αἱ κατὰ τὴν πῤῃμναν οἰκήσεις, θαυμάσια πάντα μοι ἔδοξε. Lucretius, iv. 905, 906, *milliarque per trochleas et tympana pondere magno | commovet atque levi sustollit machina nisu*. These *trochleæ* and *tympana* are probably the στροφεῖα and περιαγωγεῖς, for the context is about a ship. Apollonios Rhodios, i. 566, 567, ἐπ' ἱκρύφωι δὲ κάλωις | ξεστῆσιν περόνησι διακριδὸν ἀμφιβαλόντες. The phrase ἐπ' ἱκρύφωι must here denote the stern, as in *Odyssey*, xiii. 74, already quoted in note 130 on p. 57. See also Oppian, de piscatione, i. 229, 230, πῤῃμνῃ δ' ἐπὶ πάντα χαλῶν | ἰθὺντῃρ ἀνίσχῃ, and Valerius Flaccus, iv. 679, 680, *sed neque permissis iam fundere rector habenis | vela, nec eniti remis pote*. These *habenæ* or χαλῶν are probably the brailing-ropes; and so also the κάλωις.

ship was put on either tack; the other half being thereby transformed into a triangle with base extending from the middle of the yard to the leeward end of it and apex terminating in the sheet below<sup>306</sup>.

The sail used generally to be made of linen<sup>307</sup>; but the fibre of the papyrus and various other rushes was employed as well as flax in the manufacture of sail-cloth<sup>308</sup>. This cloth was probably of many different qualities; and two were

<sup>306</sup> Aristotle, *mechanica*, 8, διὰ τί, ὅταν ἐξ οὐρίας βούλωνται διαδραμεῖν μὴ οὐρίου τοῦ πνεύματος ὄντος, τὸ μὲν πρὸς τὸν κυβερνήτην τοῦ ἱστίου μέρος στέλλονται, τὸ δὲ πρὸς τὴν πρῶραν ποδιαῖον ποιησάμενοι ἐφιάσιν; ἢ διότι ἀντισπᾶν τὸ πηδάλιον πολλῶ μὲν ὄντι τῷ πνεύματι οὐ δύναται, ὀλίγῳ δέ, διὸ ὑποστέλλονται; προάγει μὲν οὖν τὸ πνεῦμα, εἰς οὐρίον δὲ καθίστησι τὸ πηδάλιον, ἀντισπῶν καὶ μοχλεῖον τὴν θάλατταν. For ποδιαῖον read ποδωτόν, cf. Lycophron, 1015, ποδωτοῖς ἐμφοροῦμεναι λίνοις, sc. πνοαί. The passage shews that, when the yard was braced round, the sail was furled upon the arm that came aft, and left unfurled upon the arm that went forward. And clearly it was the arm to windward that was braced aft; for if this arm had been braced forward and carried the outstanding portion of the sail, the wind would have twisted the ship round until this portion of the sail had got to leeward of her. The manœuvre is described by Virgil, *Æneid*, v. 830—832, *una omnes fecere pedem; pariterque sinistros, | nunc dextros, solvere sinus; una ardua torquent | cornua, detorquentique*. The πούς or pes is mentioned frequently. *Odyssey*, x. 32; *Pindar*, *Nemea*, vi. 55—57; *Sophocles*, *Antigone*, 715—717; *Euripides*, *Orestes*, 706, 707; *Lucian*, *Charon*, 3; etc. *Lucan*, v. 427, 428; *Catullus*, 4. 19—21; *Seneca*, *Medea*, 320—322; *Pliny*, ii. 48; etc. This πούς, the corner of the sail, is not to be confounded with the πούς, the rope that held the corner: for which see notes 177 and 179 on pp. 81, 82.

<sup>307</sup> *Æschylos*, *Prometheus*, 468, λινόπτερ' εὔρε ναυτίλων ὀχήματα, sc. Προμηθεύς. *Euripides*, *Iphigeneia in Tauris*, 410, νάιον ὄχημα, λινωπόροιςιν αἰθαῖς, *Hecuba*, 1080, 1081, λινόκροκον | φᾶρος στέλλων. *Oppian*, de venatione, i. 121, λινωπερέων ὄπλα νηῶν. *Apollonios Rhodios*, i. 565, καὶ δ' αὐτοῦ λῖνα χεῖρας, sc. ἱστοῦ. *Lucian*, *amores*, 6, εἰτ' ἀθρόας κατὰ τῶν κάλων τὰς ὀθόνας ἐκχέαντες, ἥρεμα μμιπλαμένου τοῦ λίνου, κ.τ.λ. *Meleager*, in the *Anthology*, xii. 53. 8, οὐριος ὑμετέρας πνεύσεται εἰς ὀθόνας. *Leonidas*, *ibid.*, x. 1. 6, πᾶσαν ἐφέλς ὀθόνην. *Lucilius*, *ibid.*, xi. 404. 4, διαπλεῖ σινδόν' ἐπαράμενος. *Euripides*, *Phaethon*, Fr. 2. 42, σινδὼν δὲ πρότονον ἐπὶ μέσον πελασσει. *Athenæos*, v. 39, βύσσινον ἔχων ἱστῖον. cf. *Herodotus*, ii. 86, vii. 181, σινδῶνος βυσσίνης. *Livy*, xxviii. 45, *Tarquinienses lintea (dederunt) in vela*. *Virgil*, *Æneid*, iii. 357, tumidoque inflatur carbasus austro, iv. 417, vocat iam carbasus auras. *Ovid*, *heroides*, 3. 58, te dare nubiferis lintea vela notis, 7. 171, præbebis carbasa ventis, *amores*, ii. 11. 41, zephyri veniant in lintea pleni, *metamorphoses*, xi. 476, 477, totaque malo | carbasa deducit. *Catullus*, 64. 225, suspendam lintea malo, cf. 227, carbasus. *Lucan*, v. 428, obliquat lævo pede carbasa, cf. 430, lintea. All these terms, λίνον, linum, ὀθόνη, carbasus, σινδὼν and βύσσος, appear to be used promiscuously in reference to linen.

certainly in use in the Athenian navy about 330 B.C., the common sail being superseded by one of finer texture and higher price<sup>300</sup>. The edges of the sail used to be bound with hide; and the skins of the hyæna and the seal were especially in request for this, as there was a superstition among sailors that these would keep off lightning<sup>310</sup>. The ropes were sometimes made from strips of hide, but oftener from the fibre of the papyrus or from flax or hemp<sup>311</sup>.

<sup>300</sup> Theophrastos, *historia plantarum*, iv. 8. 4, αὐτὸς δὲ ὁ πάπυρος πρὸς πλείστα χρησίμος. καὶ γὰρ πλοία ποιοῦσιν ἐξ αὐτοῦ, καὶ ἐκ τῆς βύβλου ἱστία τε πλέκουσιν καὶ ψάθους, κ.τ.λ. = Pliny, xiii. 22, *ex ipso quidem papyro navigia texunt, et e libro vela tegelesque, etc.* Herodotos, ii. 96, ἱστῶ δὲ ἀκανθίνῳ χρέονται, ἱστίοισι δὲ βυβλίνουσι. Pliny, xvi. 70, *namque iis (scirpis) velificant, non in Pado tantum nautici, verum et in mari piscator Africus, præpostero more vela intra malos suspendens.* In this passage Pliny uses *intra* as Herodotos uses ἔσωθεν in the passage quoted in note 178 on p. 81, and thus gives *præpostero* its literal meaning, the sail being set abaft of the mast.

<sup>309</sup> Corp. Inscr. Attic. vol. ii, no. 807, col. a, ll. 55—58, [ἐ]ν νεωρίῳ παρέδομεν [Ι]στία, σὺν τῷ παλαιῷ, [ἐ]πὶ ναῦς ΗΗΠΔΔΔΠ|||. [τ]ούτων λεπτὰ ΠΔΔ|||. no. 811, col. c, ll. 169—172, ἱστία λεπτὰ ||. ἀντὶ τούτων παρέδοσαν παχέα δύο. ὑπὲρ τούτων προσοφελουσιμ πρό[ς] τὸ διάγραμμα ΗΗΗ.

<sup>310</sup> Plutarch, *quæstiones convivales*, iv. 2. 1, καὶ γὰρ ὁ γελῶμενος οὕτως καὶ παροιμιώδης, ἔφη, βολβὸς οὐ μικρότητι διαφεύγει τὸν κεραυνόν, ἀλλ' ἔχων δύναμιν ἀντιπαθῆ, καθάπερ ἡ συκὴ καὶ τὸ δέρμα τῆς φώκης, ὥς φασι, καὶ τὸ τῆς ὑάλνης, οἷς τὰ ἄκρα τῶν ἱστίων οἱ ναύκληροι καταδιφθεροῦσι. Lucian, *navigium*, 4, παρὰ τὸν ἱστὸν ἐπὶ πολὺ ἔστημεν ἀναβλέποντες, ἀριθμοῦντες τῶν βυσσῶν τὰς ἐπιβολάς, κ.τ.λ. The sail itself was made of hide on the vessels in the Bay of Biscay. Cæsar, *de bello Gallico*, iii. 13, *pelles pro velis alutæque tenuiter confectæ, sive propter lini inopiam atque eius usus inscientiam, sive eo (quod est magis verisimile) quod tantas tempestates oceani tantosque impetus ventorum sustineri ac tanta onera navium regi velis non satis commode posse arbitrabantur.* cf. Dion Cassius, xxxix. 41, καὶ γὰρ ἱστία δερμάτινα εἶχον, ὥστε πᾶσαν τὴν τοῦ πνεύματος λοχὸν ἀπλήστως ἐσδέχεσθαι, Strabo, iv. 4. 1, ἥν γὰρ σκύτινα (τὰ ἱστία) διὰ τὴν βίαν τῶν ἀνέμων.

<sup>311</sup> Odyssey, ii. 426, ἔλκον δ' ἱστία λευκὰ ἐναστρέπτοισι βοεῦσιν. xii. 422, 423, αὐτὰρ ἐπ' αὐτῷ | ἐπίτορος βέβλητο, βοὸς μνοῖο τετευχώς. xxi. 390, 391, κείτο δ' ὑπ' αἰθούσῃ σπλον νεὸς ἀμφιελίσσης | βύβλινον, ᾧ δ' ἐπέδρασε θύρας. Hermippos, apud Athenæum, i. 49, ταῦτα μὲν ἐντεῦθεν· καὶ Αἰγύπτου τὰ κρεμαστά, | ἱστία καὶ βύβλους. Herodotos, vii. 25, παρεσκευάζετο δὲ καὶ σπλα ἐς τὰς γεφύρας βύβλινά τε καὶ λευκολίνου, ἐπιτάξας Φοινίξ τε καὶ Αἰγυπτίοισι. cf. 34, τὴν μὲν λευκολίνου Φοινίκης, τὴν δ' ἐτέρην τὴν βυβλίνην Αἰγύπτιοι. Æschylos, *Persæ*, 69, λινοδέσμῳ σχεδία πορθμὸν ἀμείψας. Euripides, *Iphigeneia in Tauris*, 1043, οὐ ναὺς χαλινούς λινοδέας ὁρμεῖ σέθεν. Ovid, *fasti*, iii. 587, *dumque parant torto subducere carbasa lino.* Persius, v. 146, 147, *tibi torta cannabe fulto | cæna sit in transtro?*

The sails used often to be coloured<sup>212</sup>, a black sail being everywhere a sign of mourning, while a purple or vermilion sail was generally the badge of an admiral or a monarch; and on vessels employed as scouts in time of war the sails and ropes were dyed the colour of sea-water, so as to keep them out of sight. In some cases the topsail seems to have been coloured, while the sail below was plain; and frequently a patchwork of colours was produced by using different stuffs in different sections of the ordinary sail, as shewn in the Egyptian ship of about 600 B.C. in fig. 12. Various inscriptions and devices used also to be woven on the sails, the titles and emblems of a Roman emperor being thus displayed upon his sail in characters of gold<sup>213</sup>. This practice is illustrated by the Roman relief of about 200 A.D. in fig. 29.

<sup>212</sup> Plutarch, Theseus, 17, πρότερον μὲν οὐδὲ μὲν σωτηρίας ἐλπίς ὑπέκειτο· διὸ καὶ μέλαν ἱστίον ἔχουσιν, ὡς ἐπὶ συμφορῇ προδήλῳ, τὴν ναὺν ἔπειπον· τότε δὲ (Αἰγέως) ἔδωκεν ἕτερον ἱστίον λευκόν, κ.τ.λ. ὁ δὲ Σιμωνίδης οὐ λευκὸν φησὶν εἶναι τὸ δοθὲν ὑπὸ τοῦ Αἰγέως, ἀλλὰ “φουνίκεον ἱστίον ὑγρῷ πεφυρμένον πρίνου ἀνθεὶ ἐριθάλλου.” cf. Æschylos, septem adversus Thebas, 857, 858, μελάγκροκον | ναύστολον θεωρίδα, Philostratos, heroica, 9. 3, ἱστίοις μέλασι, 20. 25, μέλανα ἱστία. Athenæos, xii. 49, ἡ δὲ τριήρης ἐφ’ ἧς (Ἀλκιβιάδης) κατέπλει, μέχρι μὲν τῶν κλειθρῶν τοῦ Πειραιέως προσέτρεχεν ἀλουργοῖς ἱστίοις, κ.τ.λ. cf. Plutarch, Alcibiades, 32, ἱστίῳ δ’ ἀλουργῷ τὴν ναυαρχίδα προσφέρεισθαι τοῖς λιμέσιν, Antonius, 26, ἱστίων ἀλουργῶν ἐκπεπτασμένων. See also the passages quoted from Vegetius in note 89 on p. 35, from Suetonius in note 133 on p. 59, from Lucian, Athenæos and Seneca in note 195 on p. 90, and from Procopios and Pliny in note 214 on p. 99. Philostratos, imagines, i. 18, θύρσος δ’ οὐτοσί ἐκ μέσης νεὺς ἐκπέφυκε τὰ τοῦ ἱστοῦ πράσων, καὶ ἱστία μεθῆπται ἀλουργῇ, μεταναγάζοντα ἐν τῷ κόλπῳ, χρυσαὶ δ’ ἐνὸ φανταὶ βάκχαι ἐν Τμώλῳ καὶ Διονύσου τὰν Ἀνθίαν. But here Philostratos is describing a picture of a ship, and may be thinking of the Peplos that was carried like a sail in the procession at the Panathenæa. Apparently the colours ἀλουργῆς and φουνίκεον differed only in their origin, one being obtained from the purple-fish, while the other (as Simonides remarks) was obtained from the ilex-berry. Lucian’s πυραυγῆς is probably the same as Seneca’s *rubicundum*; and this would be the colour of the *rubrica* or *μύλτος* mentioned by Procopios. The *versicoloria* of Pliny and Suetonius must be parti-coloured sails.

<sup>213</sup> Arrian, Fr. 19, apud Suidam, s. v. ναὺς:—καὶ ἐπ’ ἀκρῇ τῇ ἱστίῳ τὸ βασιλικὸν ὄνομα, καὶ ὅσοις ἄλλοις βασιλεὺς γεραίρεται, χρυσῷ ἐγκεχαράγμένα. This refers to Trajan’s ship on the Tigris. Apuleius, metamorphoses, xi. 16, *huius felicitis alvei nitens carbasus litteras voti intextas progerebat. ecce littere votum instaurabant de novi comiteatus prospera navigatione*. For the inscription V. L in fig. 29, see Corp. Inscr. Latin. vol. xiv, no. 2033; and also no. 456 for an inscription QQ. C. F. NAV upon a similar relief.

An admiral's ship was distinguished by some sort of flag in addition to any purple or vermilion sail that she might carry; and after dark a light was exhibited in lieu of the flag<sup>214</sup>. This light was simply for the guidance of the fleet, the admiral's ship leading the way, and the others requiring some indication of her course throughout the night. But in many fleets every ship was provided with a light; and here the admiral's ship must have carried her light in some distinctive place, or carried more than one, as was certainly the case in a Roman fleet in 204 B.C., where three lights were allotted to the admiral's ship and two to every transport, the ordinary war-ships carrying the single light<sup>215</sup>. An astute admiral would manage to mislead the enemy by screening or extinguishing the lights or setting them adrift on buoys<sup>216</sup>.

<sup>214</sup> Herodotos, viii. 92, ὡς δὲ ἐσεῖδε τὴν νέα (Θεμιστοκλέος) ὁ Πολύκριτος, ἔγνω τὸ σημεῖον ἰδὼν τῆς στρατηγίδος. Appian, de bellis civilibus, v. 55, πλοῖον τε ἦσαν ἀλλήλων ἡδὴ, καὶ αἱ ναυαρχίδες ἐκ τῶν σημείων ἐφαίνοντο, καὶ ἀλλήλαις προσέπλεον. ii. 89, οὐδενὶ τε ἐκφῆρας ὅση τὸν πλοῦν ποιήσεται, περὶ ἐσπέραν ἀνῆγγο ἐπαγγελίας τοῖς λοιποῖς κυβερνήταις πρὸς τὸν λαμπτήρα τῆς αὐτοῦ νεῶς καὶ μεθ' ἡμέραν πρὸς τὸ σημεῖον εὐθύνειν. cf. Diodoros, xx. 75, ἀκολουθεῖν τῇ στρατηγίδι νηὶ προσέχοντας τῷ λαμπτήρι. Xenophon, Hellenica, v. i. 8, νυκτὸς δ' ἐπιγενομένης, φῶς ἔχων, ὥσπερ νομίζεται, ἀφῆγετο, ὅπως μὴ πλανῶνται αἱ ἐπόμεναι. Procopios, de bello Vandalico, i. 13, τριῶν νεῶν, ἐν αἷς αὐτὸς τε καὶ ἡ θεραπεία ἔπλει, τὰ ἰστία ἐκ γωνίας τῆς ἀνω ἐς τριτημόριον μάλιστα ἔχρισε μιλτῶ, κοντοὺς τε ὀρθοὺς ἀναστήσας ἐν πρύμνῃ ἐκάστη ἀπεκρέμασεν ἀπ' αὐτῶν λύχνα, ὅπως ἐν τε ἡμέρα καὶ νυκτὶ αἱ τοῦ στρατηγοῦ νῆες ἐκδηλοὶ εἶεν· αἷς δὲ ἔπεσθαι τοὺς κυβερνήτας ἐκέλευε πάντας. Apparently the γωνία is here the mast-head, as in Herodotos, viii. 122. 2. Pliny, xix. 5, *tentatum est ligni linum quoque, et vestium insaniam accipere, in Alexandri Magni primum classibus, Indo amne navigantis, cum duces eius ac præfecti in certamine quodam variassent insignia navium: stupueruntque litora, flatu versicoloria implente. velo purpureo ad Actium cum M. Antonio Cleopatra venit, eodemque effugit. hoc fuit imperatoris navis insigne*. An admiral might display a coloured sail; but that could hardly be his σημεῖον or *insigne*, for no sail was carried in action. Most likely he used a flag. Tacitus, historiae, v. 22, *praetoriam navem, vexillo insignem, abripiunt*. A lantern is represented on the three-banked ship on Trajan's column, hanging from the ornament above the stern.

<sup>215</sup> Livy, xxix. 25, *lumina in navibus singula rostrata, bina oneraria haberent: in praetoria nave insigne nocturnum trium luminum fore*. These were the orders to Scipio's fleet on its voyage to Africa.

<sup>216</sup> Polyænos, v. 10. 2, λαμπτήρας δ' ἦρε τὸ πρῶθεν μέρος πεφραγμένους, ὅπως μὴ γνωρίζοιεν ἀπὸ τοῦ φωτὸς οἱ πολέμοι τὸν ἐπίπλουν. cf. Philistos, Fr. 15, apud Pollucem, x. 116, ἐπαίρεσθαι λαμπτήρας ἀντιπεφραγμένους. Polyænos, vi. 11, καὶ νυκτὸς γενομένης ἐκέλευσεν ἄραι τοὺς λαμπτήρας, οἷς αἱ τοῦ Διονυσίου νῆες εἴποντο.

A national flag, or something of the sort, used to be carried in battle by all the ships of a fleet, to distinguish them from ships belonging to the enemy<sup>217</sup>; and besides the flag that was distinctive of the admiral, a set of flags was carried on his ship for signalling. A purple flag was generally the signal for going into action, and there probably were flags of other colours; but attempts were made at semaphoring with a single flag<sup>218</sup>, and occasionally the signal was given by flashing the sunlight from a shield<sup>219</sup>. In addition to the signal for going into action, there certainly were signals for getting under way, for altering the formation of the fleet by various manœuvres, for bringing to, for disembarking troops, and possibly for many other purposes<sup>220</sup>. Some flags are represented at the sterns of the Athenian ships of about 500 B.C. in fig. 19, and on the masts of the Roman ships of about 50 A.D. in figs. 26 and 27.

μετὰ μικρὸν δὲ τούτους καθελόντες ἑτέρους καθήκαν ἐς τὴν θάλατταν φελλοῖς μεγάλους ἐφηρμοσμένους, κάκ τοῦ φωτὸς ἐς τὸ πλάγιον ἐπιστρέψαντες ἐφθασαν, κ.τ.λ. Dion Cassius, xlix. 17, προείπε μὲν σφισιν ὡς διὰ πελάγους τὸν πλοῦν ποιησόμενος, ἀποσβέσας δὲ τὸ φῶς ὃ ἐν τοῖς νυκτερινοῖς πλοῖς αἱ στρατηγίδες νῆες (δπως καὶ αἱ λοιπαὶ κατὰ πόδας αὐτῶν ἐφέπωνται) προδεικνύουσι, παρά τε τὴν Ἰταλίαν παρέπλευσε, κ.τ.λ. cf. Florus, iv. 8. 9, *fugiebat extinctio praeloriae navis lumine*.

<sup>217</sup> Appian, de bellis civilibus, v. 106, καὶ τὰ σημεῖα κατὰ ναυὶ ἦτο. Polyzenos, viii. 53. 3, εἰ μὲν ἐδίωκεν αὐτὴ ναὺν Ἑλληνίδα, τὸ βαρβαρικὸν ἀνέτεινε σημεῖον, εἰ δὲ ὑπὸ Ἑλληνίδος νεὺς ἐδίωκετο, ἀνέτεινε τὸ Ἑλληνικόν, cf. 1, τὰ σημεῖα τὰ Περσικά. These can hardly be the same as the σημεῖα mentioned in note 150 on p. 67.

<sup>218</sup> Leo, tactica, xix. 41, τὸ δὲ σημεῖον ὑποσημαίνεται, ἢ ὀρθὸν ἰστάμενον, ἢ ἐπὶ δεξιᾷ ἢ ἐπὶ ἀριστερᾷ κλινόμενον καὶ ἐπὶ δεξιᾷ πάλιν ἢ ἐπὶ ἀριστερᾷ μεταφερόμενον, ἢ τινασόμενον, ἢ ὑψούμενον, ἢ ταπεινούμενον, ἢ ὀλως ἀφαιρούμενον, ἢ μετατιθέμενον, ἢ διὰ τῆς ἐν αὐτῷ κεφαλῆς ἄλλοτε ἄλλως φαινομένης ἀλλασσόμενον, ἢ διὰ σχημάτων, ἢ διὰ χρωμάτων, οἷον ποτε τοῖς παλαιαῖς ἐπράττετο. ἐν γὰρ πολέμου καιρῷ σημεῖον εἶχον τῆς συμβολῆς αἰρόντες τὴν λεγομένην φοινικίδα. Diodoros, xiii. 46, καὶ τοῖς μὲν Λακεδαιμονίοις οὐδὲν ἐφάνετο σύσσημον, τοῖς δ' Ἀθηναίοις Ἀλκιβιάδης μετέωρον ἐποίησεν ἐπίσσημον φοινικὸν ἀπὸ τῆς ἰδίας νεώς, ὅπερ ἦν σύσσημον αὐτοῖς διατεταγμένον. xiii. 77, ἃ δὲ συνιδὼν ὁ Κῶων ἦρεν ἀπὸ τῆς ἰδίας νεώς φοινικίδα· τοῦτο γὰρ ἦν τὸ σύσσημον τοῖς τριηράρχοις. cf. Polyzenos, i. 48. 2, ἐπῆρε τὴν φοινικίδα· ἦν δὲ ἀρα μάχης σύνθημα τοῖς κυβερνήταις.

<sup>219</sup> Diodoros, xx. 51, Δημήτριος μὲν οὖν, τῶν ἐναντίων ἀποσχὼν ὡς ἂν τρεῖς σταδίους, ἦρε τὸ συγκείμενον πρὸς μάχην σύσσημον, ἀσπίδα κεχρυσωμένην, φανεράν πασιν ἐκ διαδοχῆς. Herodotos, vi. 115, τοῖσι Πέρσῃσι ἀναδέξαι ἀσπίδα ἐοῦσαι ἦδη ἐν τῇσι νηυσί. Plutarch, Lysander, 11, κατὰ μέσον τὸν πόρον ἀσπίδα χαλκῇ ἐπάρσθαι πρῶταθεν ἐπὶ πλοῦν σύμβολον=Xenophon, Hellenica, ii. 1. 27, ἀραι ἀσπίδα κατὰ μέσον τὸν πλοῦν.

On board a ship there was generally a lead for sounding ; and this seems to have been armed with grease to bring up samples of the bottom<sup>221</sup>. And it is said that ships were fitted with a pair of paddle-wheels for reckoning the distances they traversed ; the notion being that these wheels would be kept steadily in motion by the impact of the water on the paddles as the ship went on her course, and that her progress could therefore be computed from the number of revolutions they recorded<sup>222</sup>. But obviously this would be impracticable, unless the water were preternaturally smooth.

Ships generally were provided with a ladder or a gangway for people to come on board when the vessel was made fast to the shore. The ladder may be noticed at the stern of the Athenian ships of about 500 B.C. in fgs. 17 to 19 ; and this was probably its usual place, for it would be wanted hereabouts, as vessels usually were made fast by the stern. The

<sup>220</sup> Herodotos, vii. 128, ἐσβάς ἐς Σιδωνίην νέα ἀνέδεξε σημήιον καὶ τοῖσι ἀλλοῖσι ἀνάγεσθαι. Thucydides, i. 49, συμμύξαντες δέ, ἐπειδὴ τὰ σημεῖα ἐκατέρους ἦρθη, ἐναυμάχουν. ii. 90, ἀπὸ σημείου ἐνὸς ἀφ' ἑνὸς ἐπιστρέψαντες τὰς ναῦς μετωπῆδον ἔπλεον. Xenophon, Hellenica, vi. 2. 30, ἐν δὲ τοῖς μεθ' ἡμέραν πλοῖς ἀπὸ σημείων τότε μὲν ἐπὶ κέρως ἦγε, τότε δ' ἐπὶ φάλαγγος, cf. 28. Dion Cassius, l. 31, καὶ μετὰ τοῦτο τὰ κέρατα ἐξαίφνης ἀμφοτέρω ἀπὸ σημείου ἐπεξαγαγὼν ἐπέκαμψεν. Polyænos, iii. 9. 63, ὥς δὲ ἦδη σύμμετρον ὑπέλαβεν εἶναι τὸ τῆς θαλάσσης βάθος, ἀνέτεινε τὸ σημεῖον τῆς ἐκβάσεως. Plutarch, Antonius, 67, ἐκεῖνη δέ, γνωρίσασα σημείων ἀπὸ τῆς νεώς, ἀέσχε. Livy, xxxvii. 24, signo sublato ex pratoria nave, quo dispersam classem in unum colligi mos erat. Aulus Hirtius, de bello Alexandrino, 45, vexillo sublato, quo pugnandi dabat signum.

<sup>221</sup> Herodotos, ii. 5, ἔτι καὶ ἡμέρης δρόμον ἀπέχων ἀπὸ γῆς, κατεῖς καταπειρητηρίην πηλὸν τε ἀνοίσεις καὶ ἐν ἑνδεκα ὀργυῖσι ἔσσει, cf. 28. Acts, xxviii. 28, καὶ βολίσαντες εὖρον ὀργυιάς ἑκοσι, βραχὺ δὲ διαστήσαντες καὶ πάλιν βολίσαντες εὖρον ὀργυιάς δεκαπέντε. Lucilius, apud Isidorum, origines, xix. 4. 10, hunc catapiratem puer eodem deferat unctum, | plumbi pauxillum rodus, linique mēaxam. Statius, silvæ, iii. 2. 30, exploret rupes gravis arte molybdis.

<sup>222</sup> Vitruvius, x. 9. 5, traicitur per latera parietum axis habens extra navem prominentia capita, in quæ includuntur rotæ diametro pedum quaternum, habentes circa frontes affixas pinnae aquam tangentes. 7, ita navis cum habuerit impetum aut remorum aut ventorum flatu, pinnae quæ erunt in rotis tangentes aquam adversam, vehementi retrorsus impulsu coacte versabunt rotas : eæ autem involvendo se agent axem, etc. Then, by means of cogged wheels, etc., a stone was dropped into a bronze pan at every four-hundredth revolution of the wheels outside. ita et sonitu et numero indicabit milliaria spatia navigationis. In thus reckoning that the ship would make 5000 ft. of headway during 400 revolutions of a wheel that was 4 ft. in diameter, Vitruvius is forgetting that water is not so firm as land



gangway was presumably a heavier structure than the ladder, if there was really any difference between the two; but the names seem to be used indiscriminately<sup>223</sup>. In the Athenian navy the war-ships carried two ladders apiece; and they also carried three poles of different sizes<sup>224</sup>. Such poles were needed whenever a ship had to be pushed off from the shore or kept at a distance from another ship: so they generally formed part of the outfit<sup>225</sup>.

<sup>223</sup> Thucydides, iv. 12, καὶ ὁ μὲν (Βρασίδας) τοὺς τε ἄλλους τοιαῦτα ἐπέσπερχεν, καὶ τὸν ἑαυτοῦ κυβερνήτην ἀναγκάσας ὀκείλαι τὴν ναὺν ἔχουσι ἐπὶ τὴν ἀποβάθραν· καὶ πειρώμενος ἀποβαίνειν ἀνεκόπη ὑπὸ τῶν Ἀθηναίων, καὶ τραυματισθεὶς πολλὰ ἐλειποφύχσέ τε, καὶ πεσόντος αὐτοῦ ἐς τὴν παρεξείρεσιαν ἡ ἀσις περιεβρύη ἐς τὴν θάλασσαν. Diodoros, xii. 62, ἡ μὲν τριήρης ἐπώκειλεν, ὁ δὲ Βρασίδας ἐπιβάς ἐπὶ τὴν τῆς νεὸς ἐπιβάθραν, κ.τ.λ. Plutarch, de gloria Atheniensium, 3, καὶ ὁ τὸν κυβερνήτην ἐπισπέρχων Βρασίδας ἐξοκέλλειν, καὶ χωρῶν ἐπὶ τὴν βάθραν, καὶ τραυματιζόμενος καὶ λιποφυγῶν καὶ ἀποκλίνων εἰς τὴν παρεξείρεσιαν. As a war-ship must have been beached stern forward on account of her ram, the term παρεξείρεσις must here denote the space abaft the oars, as in the passages quoted from Polyænos in note 170 on p. 75, not the space forward, as in those quoted from Thucydides in note 141 on p. 62. Herodotos, ix. 98, παρὰ σκευασμένοι ὦν ἐς ναυμαχίην καὶ ἀποβάθρας καὶ τὰ ἄλλα ὅσων ἔβρε, ἐπλῶον ἐπὶ τῆς Μυκάλῃς. 99, προσσχοῦντες τὰς νέας ἀπέβησαν ἐς τὸν αἰγιαλόν. Lucian, dialogi mortuorum, 10. 10, εὖ ἔχει· ὥστε λῦε τὰ ἀπόγεια, τὴν ἀποβάθραν ἀνελώμεθα, τὸ ἀγκύριον ἀνеспάσθω, κ.τ.λ. Polyænos, iv. 6. 8, ἄλλοι μὲν ἀνέσπων τὰ πρυμνήσια, ἄλλοι δὲ ἀνείλκον τὰς ἀποβάθρας, ἄλλοι δὲ ἀγκύρας ἀνιμῶντο. Euripides, Iphigenia in Tauris, 1350—1352, οἱ δ' ἐπωπιδῶν | ἀγκύρας ἐξανήκτον, οἱ δὲ κλίμακας | ... | σπεύδοντες ἦγον διὰ χερῶν πρυμνήσια. In this passage there is obviously a lacuna. Theocritus, xxii. 30, 31, ἐνθα μᾶς πολλοὶ κατὰ κλίμακος ἀμφοτέρων ἔξ | τοίχων ἄνδρες ἔβαινον Ἰησονίης ἀπὸ νηός. Arrian, anabasis, i. 19, κλίμακας φέρειν ἐπὶ τὰς πύρας τῶν τριηρῶν κελεύσας, ὡς κατὰ τὰ ἀπότομα τῆς νήσου, καθάπερ πρὸς τεῖχος, ἐκ τῶν νεῶν τὴν ἀπόβασιν ποιησόμενος. The κλίμακες and ἀποβάθρα seem to be distinguished in Latin as *scala* and *pons* respectively. Virgil, Æneid, x. 653, 654, *forte ratis celsi coniuncta crepidine saxi | expositis stabat scalis et ponte parato*, cf. 288. Statius, silvæ, iii. 2. 54, 55, *iamque ratem terris divisit fune soluto | navita, et angustum deiecit in aquora pontem*.

<sup>224</sup> Corp. Inscr. Attic. vol. ii, no. 793, col. a, ll. 28—37, [κλ]ιμακίδων ἀριθμὸς [H]HHHΔΓΓ· [αὐτ]αι γίγνονται ἐπὶ [να]ύς HHΔΔΔII [καὶ] μία κλιμακίς. [κοντ]ῶν ἀριθμὸς [H]HΔΔΓII· [οὐτ]οὶ γίγνονται ἐπὶ [να]ύς HHΔΔΓΓ καὶ κοντοὶ δύο, cf. no. 789, col. a, l. 21, κοντὸν μέγαν, no. 791, l. 29, κοντοῦ μικροῦ.

<sup>225</sup> Odyssey, ix. 487, 488, αὐτὰρ ἐγὼ χεῖρσσι λαβὼν περιμήκεα κοντὸν | ὥσα παρέξ. Thucydides, ii. 84, καὶ ναὺς τε νηὶ προσέπιπτε καὶ τοῖς κοντοῖς διωθούντο. cf. Procopius, de bello Vandalico, i. 13, τοῖς κοντοῖς διωθόμενοι. Euripides, Iphigenia in Tauris, 1350, κοντοῖς δὲ πύρραν εἶχον. Virgil, Æneid, v. 208, 209, *ferratasque trudes et acuta cuspide contos | expediunt*. See also Tacitus, annales, xiv. 5, and Suetonius, Tiberius, 62, Caligula, 31.

A small boat used to be towed astern by every merchant-ship of any size, and also by the war-ships in the Roman navy; and occasionally a merchant-ship took two or three. The boat was intended for the safety of the crew in case the ship were wrecked or had to be abandoned; and ordinarily was used for communicating with the shore when the ship was lying some way out<sup>226</sup>. Apparently, the Roman and Byzantine merchant-ships had some means of hoisting up the boat<sup>227</sup>.

<sup>226</sup> Demosthenes, in Phormionem, 10, ὁ δὲ Λάμπρις ἀναχθεὶς ἐναυάγησεν οὐ μακρὰν ἀπὸ τοῦ ἐμπορίου. καὶ αὐτὸς μὲν ἀπεσώθη ἐν τῷ λέμβῳ, κ.τ.λ., in Zenothemin, 6, ῥίπτει ἐαυτὸν ('Ηγέστρατος) εἰς τὴν θάλατταν, διαμαρτῶν δὲ τοῦ λέμβου διὰ τὸ νύκτ' εἶναι, ἀπεπνίγη, 7, ἔπειθε (Ζηνόθεμος) τὸν πρῶτα καὶ τοὺς ναῦτας εἰς τὸν λέμβον ἐμβαλεῖν καὶ ἐκλείπειν τὴν ναὺν τὴν ταχίστην, ὡς ἀνεπίστου τῆς σωτηρίας οὐσης καὶ καταδυσομένης τῆς νεὺς αὐτίκα μάλα. Anaxandrides, apud Athenæum, vi. 41, ὑμεῖς γὰρ ἀλλήλους ἀεὶ χλευάζετε, οἷδ' ἀκριβῶς· | ὅπισθεν ἀκολουθεὶ κόλαξ τῷ, λέμβος ἐπικέκληται. cf. Pliny, epistolæ, viii. 20. 7, *sæpe minores maioribus velut cymbulae onerariis adhaerescunt*. Plutarch, Demetrius, 17, προσέχων μὲν οὐκ εἶασε τῇ γῇ τὸ πλοῖον, ἀγκύρας δ' ἀφείναι κελεύσας καὶ κατὰ ναὺν ἔχειν ἀτρέμα πάντας, αὐτὸς ἐμβὰς εἰς τὸ ἐφόλκιον ἐξῆλθε μόνος. Heliodoros, Æthiopica, v. 24, ἐπιτρέπομεν εἰς τὸ ἐφόλκιον εἰσβῆναι καὶ σώζειν αὐτοὺς, εἰ βούλεσθε... τῶν δ' εἰς τὸ σκάφος τὸ ὑπηρετικὸν ἄλλεσθαι καὶ διαδρᾶναι βουλευομένων. In the Acts of the Apostles, xxvii. 16, 30, 32—see next note—the term σκάφη is applied to the ship's boat in imitation of the Latin usage of *scapha*. Plautus, rudens, prologus, 75, *de navi timida desuluerunt in scapham*. The Pandects, xxxiii. 7. 29, *Labeo:—si navem cum instrumento emisti, prestari tibi debet scapha navis*. Paulus:—*imo contra; etenim scapha navis non est instrumentum navis; etenim mediocritate, non genere ab ea differt; instrumentum autem cuiusque rei necesse est alterius generis esse atque ea quæque sui; quod Pomponio placuit*, cf. xxi. 2. 44 and vi. 1. 3. Thus, as a rule, every ship had one boat and no more: but there were exceptions to this rule. Strabo, ii. 3. 4, κατασκευάσασθαι πλοῖον μέγα καὶ ἐφόλκια δύο λέμβοις ληστρικοῖς ὁμοῖα. Athenæus, v. 43, ἐφόλκια δ' ἦσαν αὐτῇ τὸ μὲν πρῶτον κέρκυρος, κ.τ.λ. The Roman war-ships had boats as well as the merchant-ships: see Cæsar, de bello Gallico, iv. 26, de bello civili, ii. 43, iii. 24, 62, 101, and Aulus Hirtius, de bello Alexandrino, 46.

<sup>227</sup> Acts, xxvii. 16, νησίον δὲ τι ὑποδραμόντες, καλούμενον Καῦδα, ἰσχύσαμεν μὲν περικρατεῖς γενέσθαι τῆς σκάφης· ἦν ἄρα νηὺς κ.τ.λ. 30, τῶν δὲ ναυτῶν ζητούντων φυγεῖν ἐκ τοῦ πλοίου καὶ χαλασάντων τὴν σκάφην εἰς τὴν θάλασσαν προφάσει ὡς ἐκ πρῶτης ἀγκύρας μελλόντων ἐκτείνειν, ... 32, τότε ἀπέκοψαν οἱ στρατιῶται τὰ σχοινία τῆς σκάφης, καὶ εἶσαν αὐτὴν ἐκπεσεῖν. cf. Paulinus Nolanus, epistolæ, 49. 1, *rumpentibus (anchorarum) vinculis nautæ exterriti scaphulam demiserunt; vel ut navi fortius continendæ renouatis et altius stabilitis anchoris subvenirent, vel ut seipsos, si possent, a discrimine navis eriperent*. Agathias, iii. 21, νῆες δὲ φορτίδες μεγάλαι μετεώρους εἶχον τὰς ἀκάτους, καὶ ἀμφ' αὐτὰ δῆπον τὰ καρχῆσια τῶν ἰσίων ἀνιμηθείσας καὶ βεβαυότατα αἰωρουμένας· ἄνω δὲ στρατιῶται εἰσῆκσαν, cf. 28, τῶν δὲ ταῖς ἀκάτοις ἐφαστηγόντων.

instead of always towing it astern: and on the Roman merchant-ships of about 200 A.D. in fgs. 29 and 31 the halyards of the artemon, or bowsprit, seem to be attached to something like a boat. It was now the custom to have one of the crew constantly on duty in the boat, when towing astern, in order to keep her under control and free from water<sup>228</sup>.

<sup>228</sup> Petronius, satiræ, 102, *quin potius, inquam ego, ad temeritatem confugimus et per funem lapsi descendimus in scapham præcisoque vinculo reliqua fortune committimus? ... nunc per puppim, per ipsa gubernacula delabendum est, a quorum regione funis descendit qui scaphæ custodiam tenet. præterea illud miror, Encolpi, tibi non succurrisse, unum nautam stationis perpetuæ interdum noctuque iacere in scapha, nec posse inde custodem nisi aut cæde expelli aut præcipitari viribus. quod an fieri possit, interrogate audaciam vestram.* Gregory the Great, dialogi, iv. 57, ὁ ναύτης δὲ αὐτοῦ, Βάρακος ὀνόματι, ἐκυβέρνηα τὸν κάραβον ὅπισθεν τοῦ πλοίου· τοῦ δὲ σχοινίου κοπέντος, ἅμα τῷ κάραβῳ δὲ ἐκυβέρνηα ὑψωθεὶς, ἐν τοῖς κύμασι ἀφανὴς ἐγένετο. The Rhodian Law, in the Basilics, liii. 8. 46, εἰὰν κάραβος, ἀπὸ ἰδίου πλοίου τὰ σχοινία διαρρήξας, ἀπόληται ἅμα τοῖς ἐμπλέονσιν ἐν αὐτῷ, εἰὰν οἱ ἐμπλέοντες ἀπόλωνται ἢ ἀποθάνωσι, τὸν μισθὸν τὸν ἐνιαυσιαῖον ἀποδιδότω ὁ ναύκληρος εἰς πλήρες τοῦ ἐνιαυτοῦ τοῖς τῶν ναυτῶν κληρονόμοις.

## APPENDIX.

### *Actuariæ, ἄκατοι.*

These were small craft of all sorts. They were classed together in this fashion in compliance with a notion that ships might roughly be divided into three classes, men-of-war or long ships, merchant-men or round ships, and these boats or little ships.

Thucydides, vii. 59, ἐκλῆγον οὖν τὸν τε λιμένα εὐθὺς τὸν μέγαν τριήρεσι πλαγίαις καὶ πλοίοις καὶ ἀκάτοις, ἐπ' ἀγκυρῶν ὁρμύζοντες, κ.τ.λ.=Diodoros, xiii. 14, ἀκάτους τε γὰρ καὶ τριήρεις, ἐτι δὲ στρογγύλας ναῦς ἐπ' ἀγκυρῶν ὁρμύσαντες. Plutarch, de tranquillitate animi, 3, ἀλλ' ὥσπερ οἱ δειλοὶ καὶ ναυτιῶντες ἐν τῷ πλεῖν, εἴτα ῥῶον οἰόμενοι διάξειν, ἐὰν εἰς γαῦλον ἐξ ἀκάτου, καὶ πάλιν ἐὰν εἰς τριήρη μεταβῶσιν, οὐδὲν περαινουσι. Pindar, Nemea, v. 5, ἀλλ' ἐπὶ πάσας ὀλκάδος ἐν τ' ἀκάτῳ, γλυκεῖ' αἰοῖδά. Thus the ἀκατοι were distinguished from merchant-ships of every sort, and also from the three-banked ships, which were the typical war-ships. And this distinction was based upon their size; for at the time when the Athenian three-banked ships carried two masts—see note 181 on p. 83—these masts were styled ἱστὸς μέγας and ἱστὸς ἀκάτειος respectively, as though ἀκάτειος merely denoted inferiority in size. cf. Theophrastos, historia plantarum, v. 7. 2, τὴν δὲ τρώπιν (ποιούσι) τριήρη μὲν δρυῖνην, ταῖς δὲ ὀλκάσι πευκίνην, ταῖς δὲ ἐλάττοσιν δξύλην, where ἀκάτοις is replaced by ἐλάττοσιν.

Aulus Hirtius, de bello Alexandrino, 44, nam cum ipse (Vatinius) paucas in portu naves longas haberet, navibus actuariis, quarum numerus erat satis magnus, magnitudine quamquam non satis iusta ad præliandum, rostra imposuit. Sisenna, apud Nonium, p. 535, quibus occisis, actuarias ad viginti navis, item complures onerarias incendunt. Marcellus, in the Pandects, xlix. 15. 2, navibus longis atque onerariis propter belli usum postliminium est: non piscatoriis, aut si quas actuarias voluptatis causa paraverunt. Thus the *actuariae*, like the ἀκατοι, were distinguished from the merchant-ships and from the war-ships; and Aulus Hirtius implies that the distinction was based upon their size.

There is plainly an error in the current reading of Livy, xxxviii. 38, traditio et naves longas armamentaque earum: neve plures quam decem naves actuarias, quarum nulla plus quam triginta remis agatur, habeto: neve monerem ex belli causa, quod ipse illaturus erit=Polybios, xxii. 26, ἀποδοῦναι δὲ καὶ τὰς ναῦς τὰς μακρὰς καὶ τὰ ἐκ τούτων ἄρμενα καὶ τὰ σκεύη· καὶ μηκέτι ἐχέτω πλὴν δέκα καταφράκτων· μηδὲ τρακοντάκωπον ἐχέτω, μηδὲ ἐλαυνόμενον πολέμου ἐνεκεν, οὐ ἂν αὐτοῖς

κατάρχη, where both authors are quoting from the treaty of 189 B.C. In quoting from the treaty of 197 B.C. Livy says *naves tectas*, xxxiii. 30, while Polybios says *καταφράκτους ναῦς*, xviii. 27; so that in quoting from this treaty of 189 B.C. he must have said *decem naves tectas habeto: neve actuarias*. Consequently, the passage will not identify the *actuarie* with the *κατάφρακτοι* but will only shew that these vessels often carried more than thirty oars. The term *actuarii* had a diminutive *actuariolus*; and this is applied to some ten-oared vessels by Cicero, ad Atticum, xvi. 3. 6, *conscendens e Pompeiano tribus actuariolis decemscalmis*.

The term *ἄκατος* could be applied to vessels that were small enough for the oars to be sculled in pairs, or to vessels that were large enough to require fifty rowers. Leonidas of Tarentum, in the Anthology, vi. 4. 6, *καὶ τοὺς ἐξ ἀκάτων διχθαδίους ἐρέτας*. cf. vii. 464. 1, ix. 242. 8, 279. 1, where Charon's boat is styled an *ἄκατος*. Lucian, *veræ historiæ*, i. 5, *πεντήκοντα δὲ τῶν ἡλικιωτῶν προσποιησάμην τὴν αὐτὴν ἔμοι γνώμην ἔχοντας, καὶ κυβερνήτην τὸν ἄριστον μισθῷ μεγάλῳ πείσας παρέλαβον, καὶ τὴν ναῦν—ἄκατος δὲ ἦν—ὥς πρὸς μέγαν καὶ βλαίον πλοῦν ἐκρατυνάμην*. Apparently, the diminutive term *ἀκάτιον* could not be applied to such large vessels as those of fifty oars. Polybios, i. 73, *παρεσκεύαζον δὲ καὶ τὰ περιλιπῆ τῶν πλοίων, τριήρεις, καὶ πεντηκοντόρους, καὶ τὰ μέγιστα τῶν ἀκάτιων*. This term was used in speaking of vessels that were carried about in carts or on men's shoulders. Thucydides, iv. 67, *ἀκάτιον ἀμφηρικὸν ὡς λησται εἰώθεσαν ἐπὶ ἀμάξῃ διὰ τῆς τάφρου κατακομίζειν τῆς νυκτὸς ἐπὶ τὴν θάλασσαν καὶ ἐκπλεῖν*. Plutarch, Lucullus, 9, *τῆς δὲ Δασκυλίτιδος λίμνης πλεομένης ἀκατίους ἐπεικῶς εὐμεγέθεσι, τὸ μέγιστον αὐτῶν ὁ Λούκουλλος ἀνεγκύσας καὶ διαγωγὴν ἀμάξῃ πρὸς τὴν θάλατταν ὅσους ἔχωρει στρατιώτας ἐνεβίβασεν*. See also Strabo, xi. 2. 12, quoted in the note on *camarii* on p. 107. But the diminutive was not indispensable. Agathias, iii. 20, *τὰς ἀκάτους, ὁπόσας ἐφ' ἀμαξῶν ἐπήγετο, ἐς τὸν ποταμὸν ἐμβαλὼν*.

In common parlance the term *ἄκατος* was used as vaguely as *boat* is used in English. Theognis, 457—459, *οἷτοι σύμφορον ἔστι γυνὴ νέα ἀνδρὶ γέροντι | οὐ γὰρ πηδάλῳ πεῖθεται ὡς ἄκατος, | οὐδ' ἀγκυραὶ ἔχουσιν*. Critias, apud Athenæum, i. 50, *Θῆβη δ' ἄρματ' ἀντα δίφρον συνεπῆξατο πρώτῃ | φορτηγούς δ' ἀκάτους Κἄρες, ἀλὸς ταμίαι*. Herodotos, vii. 186, *τοὺς ἐν ταῖσι σιταγωγαῖσι ἀκάτοιςι ἐόντας* = vii. 184, *τῶν σιταγωγῶν πλοίων καὶ ὅσοι ἐνέπλων τοῦτοιςι*. Diodoros, xvii. 116, *καὶ πλέοντος μετὰ τῶν φίλων ἐν τισιν ἀκάτοις, ἐφ' ἡμέρας μὲν τινὰς ἀποσχισθείσης τῆς νεὺς ἀπὸ τῶν ἄλλων σκαφῶν, ἐπλανήθη μόνος, κ.τ.λ.* The diminutive term *ἀκάτιον* was used in the same vague way. Dion Chrysostom, oratio 72, p. 628, *ὥστε καὶ ἐφ' ἡμῶν ἴσως ρηθῆναι εἰκότως, ὅτι πλεῖ πάντα ὁμοίως ἀκάτια καὶ πᾶσα βούς ἀποτριᾷ*. And so also *acatium* in Latin. Pliny, ix. 49, *navigeram similitudinem et aliam in Propontide visam sibi prodidit Mutianus: concham esse acatii modo carinatam, inflexa prorrhæ, prora rostrata: in hac condi nauplium*, where the phrase *acatii modo carinatam* merely expresses the fact that there was a ridge along the shell like the keel of a boat. It was clearly for a joke that the name *Acatus* was given to the great ship that brought the Flaminian obelisk to Italy: see note 71 on p. 27.

### *Barides, Βάριδες.*

This term could be applied to ships or boats of any sort, provided that they hailed from Egypt or some other foreign country.

Æschylos, *Persæ*, 552, 553, *Πέρξης δὲ πάντ' ἐπέσκε δυσφόρους | βαρίδεσσι*

ποντίαις, 1074, 1075, τρισκάλμοισι | βάρισιν δλόμενοι, i.e. τριήρεσιν. Euripides, Iphigenia in Aulide, 297, βαρβάρους βάριδας. Æschylos, supplices, 874, Αἰγυπτίαν γὰρ βάρην οὐχ ὑπερβορεῖ, cf. 836, 882. Propertius, iii. 11. 44, *baridos et contis rostra Liburnia sequi*. The allusion is to Cleopatra's ships at the battle of Actium. Herodotos, ii. 96, τοῦτο γὰρ δὴ ὀνομά ἐστι τοῖσι πλοίοισι τοῦτοις, sc. βάρης. He is speaking here of trading-vessels on the Nile: see also ii. 41, 179. Diodoros, i. 96, συμφωνεῖν δὲ καὶ τᾶλλα τὰ παρὰ τοῖς "Ἑλλήσι καθ' "Αἰδου μυθολογούμενα τοῖς ἐτι νῦν γινομένοις κατ' Αἰγυπτον· τὸ μὲν γὰρ διακομίζον τὰ σώματα πλοῖον βάρην καλεῖσθαι, κ.τ.λ. cf. Leonidas of Tarentum, in the Anthology, vii. 67, 'Αἶδεω λυπηρὲ διηκόνε, τοῦτ' Ἀχέροντος | ὕδωρ δε πλώεις πορθμίδι κυανέη, | δέξαι μ', εἰ καὶ σοι μέγα βρίθεται ὀκρυβέσσα | βάρης, ἀποφθίμενον, τὸν κύνα Διογένην.

The word was *barit*, *bari*, or *baair* in Egyptian.

### *Camarae*, Καμάραι.

These were boats of very light build, holding twenty-five to thirty men apiece. The stern was like the stem, and the oars were arranged for rowing either way. The bottom was rather flat, and the sides were so low that temporary bulwarks were needed in rough weather. These vessels were in use on the Black Sea in the First Century A.D.

Strabo, xi. 2. 12, ζῶσι δὲ ἀπὸ τῶν κατὰ θάλατταν ληστοηρίων, ἀκάτια ἔχοντες λεπτά, στενὰ καὶ κοῦφα, ὅσον ἀνθρώπους πέντε καὶ εἰκοσι δεχόμενα, σπάνιον δὲ τράκοντα δέξασθαι τοὺς πάντας δυνάμενα· καλοῦσι δ' αὐτὰ οἱ "Ἕλληνες καμάρας..... ἐπανιόντες δὲ εἰς τὰ οἰκεία χωρία, ναυλοχεῖν οὐκ ἔχοντες, ἀναθέμενοι τοῖς ὤμοις τὰς καμάρας ἀναφέρουσιν ἐπὶ τοὺς δρυμούς, ἐν ὁσπερ καὶ οἰκοῦσι, λυτράν ἀρπύγην· καταφέρουσι δὲ πάλιν, ὅταν ἡ καιρὸς τοῦ πλεῖν. τὸ δ' αὐτὸ ποιοῦσι καὶ ἐν τῇ ἀλλοτρίᾳ. Tacitus, *historiæ*, iii. 47, *camaras vocant artis lateribus latam alvum sine vinculo aris aut ferri conexam: et tumido mari, prout fluctus attollitur, summa navium tabulis augent, donec in modum tecti claudantur. sic inter undas voluntur, pari utrimque prora et mutabili remigio, quando hinc vel illinc appellere indiscretum et innoxium est*. By thus contrasting the *latam alvum* with the *artis lateribus* Tacitus implies that the bottom was broad considering the height of the sides, not that it was broad considering the size of the boat: so he hardly contradicts Strabo's statement that these boats were narrow.

### Κάνθαροι, Κυκνοκάνθαροι, Κύκνοι.

These were merchant-ships of types that were in vogue among the Greeks in the Fourth and Fifth Centuries B.C. The *κυκνοκάνθαροι* were presumably of a type between the *κάνθαροι* and the *κύκνοι*.

Nicostratos, apud Athenæum, xi. 48, Α. ἡ ναὺς δὲ πότερ' εἰκόσορος ἐστίν, ἡ κύκνος, | ἡ κάνθαρος; τοῦτ' ἂν εἴην πύθωμ' ὁ τι, | αὐτὸς περανὼ τὰ πάντ'. Β. ἀμέλει κυκνοκάνθαρος. This indicates that these vessels all resembled an *εἰκόσορος*, and an *εἰκόσορος* was usually a large merchant-ship with twenty oars for auxiliary work: see note 51 on p. 20. Ships termed *κάνθαροι* are also mentioned by Sosicrates, *ibid.*, λεπτή δὲ κυρτοῖς ἐγγελλῶσα κύμασιν | αἶρα, κόρη Σκείρωνος, ἡσύχω ποδὶ | προσήγε πρῶως καὶ καλῶς τὸν κάνθαρον. Again by Menander, *ibid.*, Α. ὡς ἐς καλὸν | τὸν υἱὸν εὐτυχοῦντα καὶ σεσωσμένον | πρῶτος λέγω σοι, τὸν τε

χρυσούν κάνθαρον. | B. ποῖον ; A. τὸ πλοῖον· οὐδὲν οἶσθας, ἄθλιε. | B. τὴν ναῦν σεσώσθαι μοι λέγεις ; A. ἔγωγε μὴν | τὴν ναῦν ἐκείνην, ἣν ἐποίησε Καλλικλῆς | ὁ Καλύμνιος, Εὐφράνωρ δ' ἐκυβέρνα Θούριος. And by Aristophanes, pax, 143, τὸ δὲ πλοῖον ἔσται Ναξιουργῆς κάνθαρος. But there is not any further mention of ships termed κύκνοι or κυκνοκάνθαροι.

### *Caudicariæ or Codicariæ.*

This name was given to vessels plying on the Tiber, and hence to those on other rivers. It was reputed to be an early Latin name for boats or ships.

Seneca, de brevitate vitæ, 13, *hoc quoque quærentibus remittamus, quis Romanis primus persuaserit navem conscendere?* Claudius is fuit, *Caudex* ὁ hoc ipsum appellatus, quia plurium tabularum contextus caudex apud antiquos vocatur, unde publica tabula codices dicuntur et naves nunc quoque, quæ ex antiqua consuetudine comteatus per Tiberim subvehunt, codicariæ vocantur. Varro, apud Nonium, p. 535, *quod antiqui pluris tabulas coniunctas codices dicebant ; a quo in Tiberi navis codicarias appellamus.* The boatmen on the Tiber are mentioned frequently: e.g. Corp. Inscr. Latin. vol. xiv, no. 131, l. 7, *codicari nabiculari*, no. 170, l. 10, *codicarii nabicularii*, no. 4234, l. 5, *codicarius*, vol. vi, no. 1759, l. 15, *caudicarius*. Sallust, apud Nonium, p. 535, *quam maximis itineribus per regnum Ariobarzannis contendit ad flumen Euphraten qua in parte Cappadocia ab Armenia diiungitur ; naves codicarias, occulte per hiemem fabricatæ, aderant.* Ausonius, idyllia, 10. 197, *navita caudiceo fluitans super æquora lembo.* This refers to the Moselle.

At Ostia, near the mouth of the Tiber, there was a guild of these boatmen with the title of *corpus splendidissimum codicariorum*: see Corp. Inscr. Latin. vol. xiv, no. 4144, l. 12.

### *Celoces, Κέλητες, Κελήτια.*

These were small vessels built especially for speed, and hence styled race-horses. They served for carrying reports and orders and despatches, and taking officers of rank from place to place ; and generally discharged the duties that are now allotted to a despatch-boat or admiral's-yacht. They were in use in most navies in the first five centuries B.C.

Thucydides, iv. 120, ἀποστᾶσι δ' αὐτοῖς ὁ Βρασίδης διέπλευσε νυκτὸς ἐς τὴν Σικιώνην, τριήρει μὲν φίλῃ προπλεούσῃ, αὐτὸς δὲ ἐν κελητίῳ ἀποθὲν ἐφεπόμενος, ὅπως εἰ μὲν τιμὴ τοῦ κέλητος μείζωνι πλοίῳ περιτυγχάνοι, ἢ τριήρης ἀμύνει αὐτῷ, ἀντιπάλου δὲ ἄλλης τριήρους ἐπιγενομένης οὐ πρὸς τὸ εὐλασσον νομίζων τρέψεσθαι ἀλλ' ἐπὶ τὴν ναῦν, καὶ ἐν τούτῳ αὐτὸν διασώσειν. There is clearly an error here, κέλητος for κελητίου, or else κελητίῳ for κέλητι. The scholiast's paraphrase makes the vessel a κελήτιον in both instances ; so his reading was κελητίου. Polybios, v. 94, αἱ οἱ δ' ὑποστρέψας, ἐπλευσε πρὸς Χάλκειαν· τῶν δ' ἐκβηθησάντων, ἐκυρίευσε δύο μακρῶν πλοίων αὐτάνδρων· ἔλαβε δὲ καὶ κέλητα περὶ τὸ 'Ρίον Αἰτωλικὸν ὁμοῦ τῷ πληρώματι. Livy, xxi. 17, *naves longæ centum sexaginta, celoces duodecim.* So the κέλητες were reckoned among the small craft in a fleet. Polybios elsewhere speaks of them as vessels of a single bank, v. 62, καὶ πλοῖα τετταράκοντα· τούτων κατάφρακτα μὲν εἰκοσι διαφέροντα ταῖς κατασκευαῖς, ἐν οἷς οὐδὲν ἑλαττον ἦν τετρήρους· τὰ δὲ λοιπά, τριήρεις καὶ δίκροτα καὶ κέλητες, cf. Fr. 132, apud Suidam, s.v. ὑπερισθμίσας:—ταχὺ δέ, τοὺς κέλητας καὶ τὰς ἡμολίας ὑπερισθμίσας, ἀνήχθη. Nor is he really contra-

dicted herein by Ephippos, apud Athenæum, viii. 38, *πέντε κέλῃτας πεντέσκαλμους*. At this time the compounds formed from *σκαλμός* were used in reckoning the tholes vertically, and thus marked the number of banks of oars in a ship; so that *πεντέσκαλμος* denoted a ship of five banks, just as *τρίσκαλμος* denoted a ship of three banks: Æschylos, *Persæ*, 679, 680, *ἐξέφθινθ' αἱ τρίσκαλμοι | νᾶες ἄναες*, 1074, 1075, *τρίσκαλμοισι | βάρισιν δλόμενοι*, cf. Polybios, xvi. 3, *ταύτη δοῦσα πλεγγὴν βιαία κατὰ μέσον τὸ κύτος ὑπὸ τὸν θρανίτην σκαλμόν*, where *θρανίτης σκαλμός* must refer to the upper bank. But the verse occurs in a passage where Ephippos is mercilessly ridiculing the ostentation of Alexander the Great; and his statement that the king's *κέλῃτες* had five banks of oars—the largest number then in use—must not be taken a whit more seriously than the rest of his exaggerations.

Thucydides, iv. 9, *οὐ γὰρ ἦν ὅπλα ἐν χωρίῳ ἐρήμῳ πορίσασθαι, ἀλλὰ καὶ ταῦτα ἐκ ληστρικῆς Μεσσηνίων τριακοντόρου καὶ κέλῃτος ἔλαβον, οἱ ἔτυχον παραγενόμενοι· ὀπλῖται τε τῶν Μεσσηνίων τούτων ὡς τεσσαράκοντα ἐγένοντο*. Fully thirty of these men would be needed for the *τριακόντορος*, leaving barely ten for the *κέλῃς*. A four-oared *κελήτιον* is mentioned by Appian, *de bellis civilibus*, ii. 56, *κελήτιον ὀξὺ καὶ κυβερνήτην τὸν ἀριστον ἐμελλον ἐτοιμάσσειν*, for the number of oars is fixed by Velleius, ii. 43, *quattuor scalmorum navem una cum duobus amicis decemque servis ingressus* = Plutarch, *Cæsar*, 38, *εἰς πλοῖον ἐμβὰς τὸ μέγεθος δωδεκάσκαλμον*, where the assertion that the boat was large enough for twelve oars seems to be based upon the story that Cæsar had twelve companions on this voyage. A two-oared *κελήτιον* is mentioned by Synesios, *epistolæ*, p. 165, *ἦκεν ἐπὶ κελητίῳ διακάλμον*. At this time the compounds formed from *σκαλμός* were used in reckoning the tholes horizontally, and thus marked the number of oars in a ship of a single bank. They are used in this sense by Cicero, *ad Atticum*, xvi. 3. 6, *tribus actuariolis decemscalmis*, *de oratore*, i. 38, *duorum scalmorum naviculam*. And apparently also by Diodoros, xi. 1, *δόγμα ἔγραψαν ὅπως οἱ Κρήτες πάντα τὰ πλοῖα ἕως τετρασκάλμου ἀναπέμψωσιν εἰς Ῥώμην*, and by Plutarch, *Æmilius Paulus*, 6, *τὰς δὲ ναὺς ἀπᾶσας ἀφείλετο καὶ πλοῖον οὐδὲν αὐτοῖς τρισκάλμου μείζον ἀπέλιπε*, cf. Theseus, 19, *δόγμα κοινὸν ἦν Ἑλλήνων μηδεμίαν ἐκπλεῖν τριήρη μηδαμῶθεν ἀνδρῶν πέντε πλείονας δεχομένην*, where *τριήρης* refers to fighting-ships of any sort.

Xenophon, *Hellenica*, i. 6. 36, *τῷ δ' Ἑτεονίκῳ ὁ ὑπηρετικὸς κέλῃς πάντα ἐξήγγειλε τὰ περὶ τὴν ναυμαχίαν*. cf. Herodotos, viii. 94, for the story of a *κέλῃς* bringing a message *θεῖη πομπῇ*. Thucydides, i. 53, *ἔδοξεν οὖν αὐτοῖς ἀνδρας ἐς κελήτιον ἐμβιβάσαντες ἀνευ κηρυκείου προσπέμψαι τοῖς Ἀθηναίοις*. viii. 38, *Θηριμένης μὲν, παραδοὺς Ἀστυόχῳ τὰς ναῦς, ἀποπλέων ἐν κελήτι ἀφανίζεται*. Appian, *de bello Mithridatico*, 33, *ἐς κελήτιον ἐνέβη, καὶ ναὺν ἐκ νεώς, ἵνα λάθοι, διαμείβων, ἐπ' Ἀλεξανδρείας ἐφέρετο*, sc. Λούκουλλος. The *κέλῃτες* and *κελήτια*, or other vessels doing the same work, were often described simply as *ὑπηρετικά*. Polyænos, i. 38. 4, *Βρασίδας νυκτὸς ἐπιπλέων Σκιώνῃ, τριήρη φιλιαν προπλεῖν ἔταξεν, αὐτὸς δὲ ἐν ὑπηρετικῷ κατόπιον εἴπετο* = Thucydides, iv. 120, *αὐτὸς δὲ ἐν κελητίῳ ἀποδὲν ἐφεπόμενος*. Plutarch, *Demosthenes*, 29, *διαπλεύσας ὑπηρετικοῖς καὶ ἀποβάς μετὰ Θρακῶν δορυφόρων, Lysander, 10, πέμπων δὲ ὑπηρετικά παρὰ τὰς πρώτας τῶν νεῶν ἀτρεμεῖν ἐκέλευε καὶ μένειν ἐν τάξει*. Demosthenes, in *Polyclem*, 46, *ἀφικνεῖται ὑπηρετικόν, ἀγον ἄνδρα καὶ ἐπιστολάς*. Polyænos, iii. 9. 36, *ὑπηρετικὸν ἐκπέμψας (Ἰφικράτης) κομίζον ἐπιστολὴν πεπλασμένην*. Æschines, *de falsa legatione*, 73, *οὕτω δ' ἦν σφαλερὰ καὶ ἐπικινδύνα τὰ πράγματα, ὥστε ἡναγκάσθη γράφαι ψήφισμα Κηφισοφῶν ὁ Παιανιεὺς ἐκπλεῖν τὴν ταχίστην Ἀντίοχον τὸν ἐπὶ τῶν ὑπηρετικῶν καὶ*



ζητεῖν τὸν στρατηγὸν τὸν ἐπὶ τῇ δυνάμει τεταγμένον. This last passage shews that in the Athenian navy these ὑπηρετικά formed a distinct class under one command. They are presumably the same as the ἀκατοὶ δημόσιοι of the inventories: Corp. Inscr. Attic. vol. ii, no. 808, col. d, ll. 74, 75, ἐπὶ τὰς ἀκάτους τὰς δημοσίας, πηδάλια. And these are termed *celoces publicæ* by Plautus, captivi, iv. 2. 92—94, *nam filium | tuom modo in portu Philopoleum vivom salvom et sospitem | vidi in publica celoce*, cf. miles gloriosus, iv. 1. 39, *hæc celox illiust quæ hinc egreditur internuntia*.

The *celoces* are mentioned also by Ennius, apud Isidorum, origines, xix. 1. 22, *labitur uncta carina per æquora cana celocis*, by Turpilius, apud Nonium, p. 533, *remulis sensim celox ab oppido processerat*, by Varro, *ibid.*, *nautæ remivagam movent celocem*, and *procella frigida ne obruat celocem*, by Livy, xxxvii. 27, *piraticas celoces et lembos*, and perhaps by Velleius, ii. 73, *piraticis celetibus or sceleribus*. And there are puns on the name: Plautus, Pseudolus, v. 2. 12, *unde onustam celocem agere te prædicem*, asinaria, ii. 1. 10, *quo hanc celocem conferam*, Poenulus, iii. 1. 40, *obsecro, hercle, operam celocem hanc mihi, ne corbitam, date*.

Pliny, vii. 57, *celetem (invenerunt) Rhodii*. Possibly these Rhodian 'race-horses' were evolved from the Phœnician 'horses' mentioned on p. 113. As to the live race-horses of this name, see Pausanias, v. 8. 8, vi. 12. 1, and Pliny, xxxiv. 10.

### *Cercuri, Κέρκουροι.*

These were vessels of a type that was equally suitable for warfare and for commerce. They were in use throughout the Mediterranean from the beginning of the Fifth Century to the middle of the First Century B.C. The war-ships of this type were small, but the merchant-ships were occasionally of considerable size.

Herodotus, vii. 89, τῶν δὲ τριηρέων ἀριθμοὶ μὲν ἐγένετο ἑπτὰ καὶ διηκόσιαι καὶ χιλιαί, 97. τριηκόντεροι δὲ καὶ πεντηκόντεροι καὶ κέρκουροι καὶ ἱππαγωγὰ, πλοῖα σμικρὰ συνελθόντα ἐς τὸν ἀριθμὸν ἐφάνη τρισχίλια. That refers to the Persian fleet in 480 B.C. Arrian, *anabasis*, vi. 2, ἣν δὲ τὸ ξύμπαν πλῆθος τῶν νεῶν, τριακόντεροι μὲν ἐς ὀγδοήκοντα, τὰ δὲ πάντα πλοῖα σὺν τοῖς ἱππαγωγαῖς καὶ κερκούροις καὶ ὅσα ἄλλα ποτάμια οὐ πολὺ ἀποδέοντα τῶν δισχιλίων. That refers to Alexander's fleet on the Hydaspes in 327 B.C. Diodorus, xxiv. 1, Ῥωμαῖοι δὲ ναυτοὶ μακραις διακοσίαις τεσσαράκοντα καὶ κερκούροις ἐξήκοντα καὶ πλοίων πλῆθει παντοδαπῶν κατέπλευσαν εἰς τὴν Πάνορμον. This was in 250 B.C. Appian, *de rebus Punicis*, 75, ναυτοὶ δὲ ἐφέροντο (οἱ Ῥωμαῖοι) πενήκοντα μὲν πενήρεσιν, ἑκατὸν δ' ἡμολλαῖς, ἀφράκτοις δὲ καὶ κερκούροις καὶ στοργύλοις πολλοῖς. 121, καὶ ναυτοὶ πενήκοντα μὲν τριηρετικαῖς, κερκούροις δὲ καὶ μυοπάρωσι καὶ ἄλλοις βραχυτέροις πολλοῖς ἐξέπλεον, sc. οἱ Καρχηδόνιοι. This was in 149 B.C. and 146 B.C. Memnon, Fr. 37, apud Photium, p. 232, Μιθριδάτης δὲ ἄλλον τε στρατὸν συχνὸν παρεσκεύαζετο, καὶ τριήρεις μὲν τετρακόσιοι, τῶν δὲ μικροτέρων νηῶν πεντηκοντέρων τε καὶ κερκούρων ἀριθμὸς ἦν οὐκ ὀλίγος. This was in 74 B.C. Livy, xxxiii. 19, *ipse (Antiochus) cum classe centum tectarum navium, ad hoc levioribus navigiis cercurisque ac lembis ducentis, proficiscitur*. This was in 197 B.C. In all these instances the *cercuri* are reckoned among the small craft in a fleet. Apparently, they were faster than ships of the line. Livy, xxiii. 34, *cercuros ad persequendam retrahendamque navem quum (Flaccus) misisset, primo fugere regii conati; deinde, ubi celeritate victi cesserunt, tradunt se Romanis, etc.* That was in 215 B.C.

Plautus, mercator, i. 1. 87, 88, *ædificat navem cercurum et merces emit: | parata navi inponit, etc.*, Stichus, ii. 2. 42—45, *dum percontor portitores, ecquæ navis venerit | ex Asia, ac negant venisse, conspicatus sum interim | cercurum, quo ego me maiorem non vidisse censeo. | in portum vento secundo, velo passo pervenit*, and then follows an account of the cargo. Athenæos, v. 43, ἐφόλκια δ' ἦσαν αὐτῇ, τὸ μὲν πρῶτον κέρκουροι, τρισχίλια τάλαντα δέχεσθαι δυνάμενος· πᾶς δ' ἦν οὗτος ἐπίκωπος. A merchant-ship that carried 3000 talents, or 75 tons, was larger than most war-ships: see note 78, on p. 30. The πᾶς seems to mean that the oars were not merely auxiliary. The oars of a *cercurus* are noticed again by Lucilius, apud Nonium, p. 533, *iligneis pedibus cercurum conferet aquis*. There is probably a misreading, *cercurum* for *cerycem*, in another passage of Lucilius, *ibid.*, *ad regem legatu' Rhodum, Ecbatanam ac Babylonem | ibo; cercurum sumam*.

The name κέρκουρος is perhaps an adaptation of the Phœnician word which appears in Hebrew as *kirkêrâh*: and the name of these ships would certainly be Semitic in origin, if they really were invented in Cyprus, as Pliny asserts, vii. 57, *cercurum (invenerunt) Cyprii*. The word *kirkêrâh* is found in Isaiah, lxvi. 20, and is translated into English as *swift beast*: but the Septuagint gives σκιᾶδιον, which must denote a hood over a chariot, or else an umbrella.

### Corbitæ.

These were merchant-ships of great size. They were in use among the Romans in the First and Second Centuries B.C.

Lucilius, apud Nonium, p. 533, *multa homines portenta in Homeri versibu' ficta | monstra putant; quorum in primis Polyphemu' ducentos | Cyclops longu' pedes, et porro huic maiu' bacillum | quam malus navis in corbita maximus ulla*, where the allusion is to the Odyssey, ix. 319, 322—324, Κύκλωπις γὰρ ἔκειτο μέγα ῥόπαλον παρὰ σπηΐ·...·ὅσσον θ' ἰστὸν νηὸς ἑικοσόροιο μελαίνης, | φορτίδος, εὐρείης, ἥ τ' ἐκπερὰ μέγα λαΐτμα· | τόσσον ἔην μῆκος, τόσσον πάχος εἰσοράσθαι, so that Lucilius means the largest merchant-ship imaginable. Cicero also speaks of a *corbita* as a merchant-ship: ad Atticum, xvi. 6. 1, *sed putabam, quum Rhegium venissem, fore ut illic dolichὸν πλοὺν ὀρμυλοντες cogitaremus, corbitane Patras an actuariolis ad Leucopetram Tarentinorum, ast inde Corcyram; et, si oneraria, statimne freto an Syracusis*. Being merchant-ships, these vessels had only auxiliary oars, and could therefore make little progress in a calm. Plautus, Pœnulus, iii. 1. 3, 4, *sicut ego hos duco advocatos, homines spissigradissimos, | tardiores quam corbitæ sunt in tranquillo mari*, cf. 40, *obsecro, hercle, operam celocem hanc mihi, ne corbitam, date*. For the *celoces* see p. 108. There is a pun on *corbis* and *corbita* in Plautus, Casina, iv. 1. 20, 21, *gnovi ego illas ambas estrices; corbitam cibi | comesse possunt*, unless *corbitam cibi* should be read *corbilant ubi*.

### Cybææ.

These also were merchant-ships of great size. They were in use in Sicily in the First Century B.C.

Cicero, in Verrem, ii. iv. 8, *tametsi, rogatus de cybæa, tenetis memoria quid responderit: ædificatam publicis operis, publice coactis, eique ædificandæ publice Mamertinum senatorem præfuisse. 9, negent isti onerariam navem maximam*

*ædificatam esse Messanæ? negent, si possint. negent ei navi faciundæ senatorem Mamertinum publice præfuisse? utinam negent. 67, hæc sum rogaturus. navem populo Romano debeantne? fatebuntur. præbuerintne prætor C. Verre? negabunt. ædificaverintne navem onerariam maximam publice, quam Verri dederunt? negare non poterunt. cf. ii. v. 23, non populo Romano redditæ biremis, sed prætori donatæ cybæa.* These passages prove that a *cybæa* was a merchant-ship: nor is the contrary implied in ii. v. 17, *navem vero cybæam maximam, triremis instar, pulcherrimam atque ornatissimam, palam ædificatam sumptu publico, sciente Sicilia, per magistratumque Mamertinum tibi datam donatamque esse dico.* Cicero is arguing here that Verres had not only procured a merchant-ship from the Mamertines in place of a war-ship, but had made them build him a merchant-ship that was as big as a war-ship of three banks, when they were not bound to provide a war-ship of more than two banks.

The term *cybæa* may be equivalent to *κυβαλα* or to *κυπάλα*, the  $\beta$  and  $\pi$  interchanging easily. cf. Hesychios, s. v. *κύπαι*:—*εἰδὸς τι νεῶς*, where *κύπαι* is probably a corruption of *κυπάλα*.

### *Cymbæ, Κύμβαλ.*

These were vessels of a type invented in Phœnicia: but Latin authors applied the name to any boat.

Pliny, vii. 57, *cymbam (invenerunt) Phœnices.* Sophocles, *Andromeda*, Fr. 2, apud Athenæum, xi. 64, *ἱπποισιν ἢ κύμβασι ναυστολεῖς χθόνα*; The scene of the play was laid in Phœnicia, so Sophocles was likely to select Phœnician types of ships, and the *ἱπποι* certainly were Phœnician: see pp. 113, 114.

The name is common in Latin. Cicero, *de officiis*, iii. 14; Pliny, ix. 10, 12; Seneca, *epistolæ*, 51. 12; Lucan, iv. 136; Ovid, *tristia*, ii. 330, *amores*, iii. 6. 4, *metamorphoses*, i. 293, *fasti*, vi. 777; Virgil, *georgics*, iv. 195, 506, *Æneid*, vi. 303; Horace, *odes*, ii. 3. 28; Propertius, iii. 18. 24; Juvenal, ii. 151; etc.

### *Ἐπακτρα, Ἐπακτρίδες.*

These were small vessels of a type that probably was meant for fishing, but suitable also for some purposes in warfare.

Xenophon, *Hellenica*, i. 1. 11, *ἐνταῦθα δὲ καὶ Ἀλκιβιάδης ἦκεν ἐκ τῶν Κλαζομένων σὺν πέντε τριῖρεσι καὶ ἐπακτρίδι.* Agathias, iii. 21, *ἐπακτρίδας τινὰς ἀμφιπρόμους δέκα πληρώσαντες.* Nicander, *theriaca*, 823, 824, *ἐπεὶ μογεροῦς ἀλιῆας | πολλὰ κίς ἐμβρόξασα κατεπρήνιζεν ἐπάκτρων*, sc. *μύραινα*. The name seems to be connected with *ἐπακτήρ*, a fisherman.

Aulus Gellius, x. 25, *actuariæ, quas Græci λωτιοκώπους vocant vel ἐπακτρίδας.* See p. 114 for the *λωτιοκώποι* and p. 105 for the *actuariæ*. No doubt, all *ἐπακτρίδες* were *actuariæ*: but Aulus Gellius cannot be right in asserting that all *actuariæ* were *ἐπακτρίδες*. The *actuariæ* formed a large class which included the *κέλητες*, and if the *ἐπακτρίδες* had been the same as the *actuariæ*, there could hardly have been such vessels as *ἐπακτροκέλητες*.

### *Ἐπακτροκέλητες.*

These were vessels of a type between the *ἐπακτρίδες* and the *κέλητες*. They were in use among the Greeks in the Fourth Century B.C., especially for piracy.

Aristotle, *de interpretatione*, 2, gives *ἐπακτροκέλης* as an example of a compound name. The ships themselves are mentioned by Æschines, in Timarchum, 191, *ταῦτα πληροὶ τὰ ληστήρια, ταῦτα εἰς τὸν ἐπακτροκέλητα ἐμβιβάζει*, and also by Deinarchos : see Harpocration, s. v. *ἐπακτροκέλης* :—*Διοχίτης ἐν τῷ κατὰ Τιμάρχου. εἶδος δ' ἐστὶ πλοίου σύνθετον ἔχον τὴν κατασκευὴν ἐκ τε ἐπακτρίδος καὶ κέλητος. ἦν δὲ ὡς ἐπίπαν ληστρικόν, ὡς καὶ Δείναρχος ἐν τῇ κατὰ Πολυεύκτου δοκιμασίᾳ.*

### Γαῦλοι.

These were the great merchant-ships in which the Phœnicians made their trading-voyages in the Mediterranean and Atlantic between the Third and the Sixth Centuries B.C., and perhaps before and afterwards. The shape of the ships is indicated by their name, for that was given to any tub.

Antiphanes, *apud Athenæum*, xi. 102, A. *γαύλους ὀλοχρύσους*. B. *πλοῖα* ; A. *τοὺς κάδους μὲν οὖν | καλοῦσι γαύλους πάντας οἱ προγαστορες.* Aristophanes, *aves*, 598, *γαῦλον κτῶμαι καὶ ναυκληρῶ*, scholion, Καλλιμαχος :—*Κυπρὸς Σιδωνίως με κατήγαγεν ἐνθάδε γαῦλος.* Epicharmos, *apud Athenæum*, vii. 114, *αὐτὸς ὁ Ποσιδᾶν ἄγων γαῦλοις ἐν Φοινικικοῖς | ἦκε καλλίστας σαγήνας.* Herodotos, iii. 136, *καταβάντες δ' οὗτοι ἐς Φοινίκην καὶ Φοινίκης ἐς Σιδῶνα πόλιν αὐτίκα μὲν τριήρεις δύο ἐπλήρωσαν, ἅμα δὲ αὐτῇσι καὶ γαῦλον μέγαν παντοίων ἀγαθῶν.* vi. 17, *ὁ δὲ ἰθὺς ὡς εἶχε ἔπλωε ἐς Φοινίκην, γαῦλους δὲ ἐνταῦθα καταδύσας καὶ χρήματα λαβὼν πολλὰ ἔπλωε ἐς Σικελίην.* viii. 97, *ἐς τὴν Σαλαμίνα (Ξέρξης) χῶμα ἐπειράτο διαχοῦν, γαῦλους τε Φοινικίους συνέδεε, ἵνα ἀντὶ τε σχεδῆς ἔωσι καὶ τεύχεος, κ.τ.λ.* Scylax, *periplus*, 112, *οἱ δὲ ἔμποροί εἰσι μὲν Φοίνικες· ἐπὶ δὲ ἀφικνῶνται εἰς τὴν νῆσον τὴν Κέρνην, τοὺς μὲν γαῦλους καθορμίζουσιν, ἐν τῇ Κέρνῃ σκηρὰς ποιησάμενοι αὐτοῖς· τὸν δὲ φόρτον ἐξελόμενοι αὐτοὶ διακομίζουσιν ἐν μικροῖς πλοίοις εἰς τὴν ἡπειρον.* These passages all date from before 250 B.C., and the ships mentioned therein are all Phœnician. The name *γαῦλος* occurs again in Plutarch, *de tranquillitate animi*, 3, *ἀλλ' ὥσπερ οἱ δειλοὶ καὶ ναυτιῶντες ἐν τῷ πλεῖν, εἴτα ῥᾶον οἴμενοι διάξειν, ἐὰν εἰς γαῦλον ἐξ ἀκᾶτου, καὶ πάλιν ἐὰν εἰς τριήρη μεταβῶσιν, οὐδὲν περαινουσι.* But this does not prove conclusively that these vessels were still in use ; for Plutarch may here be quoting some old saying. The expression *γαυλικὰ χρήματα* or *γαυλιτικὰ χρήματα* stands for *cargo* in Xenophon, *anabasis*, v. 8. 1, cf. v. 1. 11, 12, 15, 16 ; and this indicates that the name *γαῦλος* might roughly be applied to any merchant-ship.

The name was probably of Phœnician origin, and was perhaps derived from *gawal* ; the island of Gozo, near Malta, being termed *Γαῦλος* in Greek and *Gawal* in Phœnician : see Corp. Inscr. Semit. part i, no. 132, ll. 1, 8, *am G(a)w(a)l, plebs Gaulitana.*

### Ἡίρρι, Ἴπποι.

These were Phœnician merchant-ships with figure-heads of horses. They came into use in Phœnicia in very early times ; but afterwards were only to be found at Cadiz, where they were employed upon the fisheries along the African coast outside the straits. Some of them were of considerable size ; and apparently these could manage to double the Cape, for about 112 B.C. one of the typical figure-heads was brought to Egypt from a wreck on the east coast of Africa, and was attributed by experts to a ship from Cadiz.

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Strabo, ii. 3. 4, πάλιν οὖν (φησὶ Ποσειδώνιος) καὶ ὑπὸ ταύτης (Κλεοπάτρας) πεμφθῆναι τὸν Εὐδοξὸν μετὰ μείζονος παρασκευῆς. ἐπανίοντα δ' ἀνέμοις παρενεχθῆναι ὑπὲρ τὴν Αἰθιοπίαν· προσφερόμενον δέ τισι τόποις ἐξοικειοῦσθαι τοὺς ἀνθρώπους μεταδόσει σιτίων τε καὶ οἴνου καὶ παλαθίδων, ὧν ἐκείνοις οὐ μετῆν, ἀντὶ δὲ τούτων ὑδρέας τε τυγχάνειν καὶ καθοδηγίας, ἀπογράφεσθαι τε τῶν ῥημάτων ἑνια. εὐρόντα δ' ἀκρόπρῳρον ξύλινον ἐκ ναυαγίου ἵππων ἔχον ἐγγεγλυμμένον, πνυθόμενον ὡς ἀπὸ τῆς ἐσπέρας πλεόντων τινῶν εἴη τὸ ναυάγιον τοῦτο, κομίζειν αὐτὸ ἀναστρέψαντα πρὸς τὸν οἰκεῖον πλοῦν. σωθέντα δ' εἰς Αἴγυπτον, οὐκέτι τῆς Κλεοπάτρας ἡγουμένης, ἀλλὰ τοῦ παιδὸς, ἀφαιρεθῆναι πάλιν πάντα· φωραθῆναι γὰρ νεοσφισμένον πολλὰ. τὸ δ' ἀκρόπρῳρον προφέροντα ἐς τὸ ἐμπόριον, δεικνύναι τοῖς ναυκλήροις, γινώσκειν δὲ Γαδειριτῶν δὴ· τούτων γὰρ τοὺς μὲν ἐμπόρους μεγάλα στέλλειν πλοῖα, τοὺς δὲ πένητας μικρά, ἃ καλεῖν ἵππους, ἀπὸ τῶν ἐν ταῖς πρῶταις ἐπισήμων· τούτους δὲ πλεῖν μέχρι τοῦ Αἰξου ποταμοῦ περὶ τὴν Μαρουσίαν ἀλιευομένους· ἀλλὰ τῶν δὴ ναυκλήρων τινὰς γινώσκειν τὸ ἀκρόπρῳρον ἐνδὲς τῶν ἀπὸ τοῦ Αἰξου ποταμοῦ πορρώτερον πλευσάντων καὶ μὴ σωθέντων ὑπάρξαν. ἐκ δὲ τούτων συμβαλλόντα τὸν Εὐδοξόν, ὡς δυνατὸς εἴη ὁ περίπλους ὁ Λιβυκός, κ.τ.λ. cf. Pliny, ii. 67, *in quo (sinu Arabico) signa navium ex Hispaniensibus naufragiis feruntur agnita*, where he seems to be referring to the story of Eudoxos, though he mentions a later date.

Pliny, vii. 57, *onerariam Hippus Tyrius invenit, lembum Cyrenenses, cymbam Phœnices, celetem Rhodii, cercurum Cyprii*. This can only mean that the Tyrians introduced the merchant-ships called Horses. Sophocles, *Andromeda*, Fr. 2, apud Athenæum, xi. 64, ἵπποισιν ἢ κύμβασι ναυστολεῖς χθόνα; Sophocles was likely to select Phœnician types of ships, as the scene of the play was laid in Phœnicia; and these ἵπποι and κύμβαι are the very ships that Pliny associates with the Phœnicians. Moreover, some vessels with figure-heads of horses are represented in Assyrian sculpture of about 700 B.C., as in fig. 9, and this indicates that the type was indigenous in that part of the world.

But ships of any sort could be described in metaphor as horses. *Odyssey*, iv. 708, 709, νηῶν ὠκυπόρων ἐπιβαινέμεν, αἰθ' ἄλδς ἵπποι | ἀνδράσι γίγνονται. *Plautus*, *rudens*, i. 5. 10, 11, *neptre equo ligneo per vias cœrulas | estis vectæ?* Thus, in the legend of the taking of Troy through the stratagem of the Wooden Horse, there is perhaps a reminiscence of the capture of some seaport town by men concealed on board a ship, which had unwarily been admitted within the harbour: cf. *Lydos*, *de mensibus*, iv. 88, περὶ τοῦ δουρείου ἵππου ὁ Εὐφορίων φησὶ πλοῖον γενέσθαι τοῖς Ἑλλησιν ἵππον λεγόμενον. And the winged horse Pegasus may represent a ship with oars. *Juvenal*, iii. 117, 118, *ripa nutritus in illa, | ad quam Gorgonei delapsa est pinna caballi*, speaking of the river which flows through Tarsus. cf. *Stephanos*, s. v. *Ταρσός*:—Ἀλέξανδρος. δὲ ὁ Πολύσις (Ταρσὸν καλεῖσθαι φησὶ) διὰ τὸν Πήγασον ἵππον ἐκεῖ τὸν ταρσὸν κλάσαντα καὶ Βελλεροφόντην ἐν τῷ Ἀλφίῳ πεδίῳ πλανηθῆναι. For the term *ταρσός* and the metaphor of the oars and wings see pp. 2, 3, 20 and note 52. The legend that Bellerophon tamed Pegasus at Corinth may refer to the initiative of the Corinthians in building ships with oars: as to which see p. 4.

#### Ἰστιόκωποι.

These were small vessels with a full complement of oars as well as sails. They were known by this name in the Second Century A.D.

Aulus Gellius, x. 25, *actuariæ, quas Græci λισιοκώπους vocant vel ἐπακτρίδας*. cf. Pollux, i. 103, ὁ ἐξ οὐράς πλοῦς ἐστίν, εἰρεσίᾳ πλεῖν, ἀνέμῳ πλεῖν· εἰρηγαὶ δὲ καὶ λισιοκώπη, ἀλλὰ βέλτιον εἰρεσίᾳ καὶ πνεύματι. Merchant-ships trusted mainly to their sails and war-ships to their oars, and were thus distinguished from these vessels which trusted equally to both. See p. 105 for the *actuariæ* and p. 112 for the *ἐπακτρίδες*.

### Ὑπηρητικά.

This name was given to the small craft in a fleet, or to any vessels in attendance on others of larger size.

Diodoros, xx. 82, εἶχε δὲ (Δημήτριος) ναὺς μακρὰς μὲν παντοίας μεγέθει διακοσίας, ὑπηρητικά δὲ πλείω τῶν ἑκατὸν ἐβδομήκοντα, xiii. 14, τριήρεις δὲ συνεπλήρωσαν (οἱ Συρακόσιοι) ἐβδομήκοντα τέτταρας· συμπαρεῖποντό τε τὰς ὑπηρητικὰς ἔχοντες ναὺς παῖδες ἐλεύθεροι = Plutarch, Nicias, 24, οὐκ αὐτοὶ μόνον ταῖς τριήρεσιν, ἀλλὰ καὶ τὰ παιδάρια πανταχόθεν ἐπιβαίνοντα τῶν ἀλιάδων καὶ ταῖς σκάφαις προσπλέοντα. See also Æschines, de falsa legatione, 73, and other passages quoted in the note on *celoces* on p. 109, especially Xenophon, Hellenica, i. 6. 36, ὑπηρητικὸς κέλῃς. Where Diodoros says ναὺς ὑπηρητικὰς, xviii. 72, Polyænos says ὑπηρεσίαν ναυτικήν, iv. 6. 8. The term ὑπηρητικὸν σκάφος is applied to a ship's-boat by Heliodoros in the passage quoted in note 226 on p. 103, and is applied to a lighter by Strabo, v. 3. 5, καὶ γὰρ ἡ τῶν ὑπηρητικῶν σκαφῶν εὐπορία τῶν ἐκδεχομένων τὰ φορτία καὶ ἀντιφορτιζόντων ταχὺν ποιεῖ τὸν ἀπόπλουον.

### Lembi, Λέμβοι.

These were small vessels of a type that was invented or perfected by the Illyrians in the Third Century B.C. They served for desultory warfare and for piracy; and differed from the regular war-ships in being relatively of larger beam, and carrying no ram.

Polybios, v. 109, Φίλιππος δὲ κατὰ τὴν παραχειμασίαν ἀναλογιζόμενος ὅτι πρὸς τὰς ἐπιβολὰς αὐτοῦ χρεῖα πλοίων ἐστὶ καὶ τῆς κατὰ θάλατταν ὑπηρεσίας, καὶ ταύτης οὐχ ὡς πρὸς ναυμαχίαν—τοῦτο μὲν γὰρ οὐδ' ἂν ἤλπισε δυνατὸς εἶναι, Ῥωμαῖοις διανυμαχεῖν—ἀλλὰ μᾶλλον ἕως τοῦ παρακομίζειν στρατιώτας, καὶ θάπτον διαλρεῖν οὐ πρόθοιτο, καὶ παραδόξως ἐπιφαίνεσθαι τοῖς πολεμοῖσι· διόπερ, ὑπολαβὼν ἀρίστην εἶναι πρὸς ταῦτα τὴν τῶν Ἰλλυριῶν ναυπηγίαν, ἑκατὸν ἐπεβάλετο λέμβους κατασκευάζειν, cf. 110. This was in 216 B.C. See also Polybios, ii. 3, 6, 8—12, iv. 16, 19, 29, v. 4, 95, 101, Livy, xxxi. 45, xxxii. 21, xxxviii. 7, xlii. 48, xlv. 30, xlv. 43, and Appian, de rebus Illyricis, 7, for λέμβοι in Illyrian fleets; and Polybios, xvi. 2, 4—7, xvii. 1, and Livy, xxxii. 32, xlv. 28, xlv. 10, 31, for λέμβοι in Macedonian fleets. These instances all fall between 231 and 168 B.C. Also see Livy, xxxiii. 19, xxxiv. 35, xxxv. 26, for λέμβοι in Syrian and Spartan fleets at that period; Polybios, i. 20, 53, for λέμβοι in Roman fleets a little before; and Diodoros xx. 85, for λέμβοι at the siege of Rhodes in 304 B.C. Polybios also speaks of some vessels on the Rhone as λέμβοι, iii. 42, 43, 46; but Livy abstains from rendering this by *lembi*, xxi. 26—28, and calls them simply *naves* or *naves actuariæ*.

The λέμβοι were always reckoned among the small craft in a fleet. Polybios, i. 20, οὐχ ὅσον κατὰφρακτος αὐτοῖς ὑπῆρχε ναὺς, ἀλλ' οὐδὲ καθόλου μακρὸν πλοῖον, οὐδὲ λέμβος οὐδὲ εἰς, xvi. 2, κατὰφρακτοι τρεῖς καὶ πενήκοντα, σὺν δὲ τούτοις ἀφρακτα, λέμβοι δὲ σὺν ταῖς πρίστειν ἑκατὸν καὶ πενήκοντα, cf. 7. Livy, xxxii. 21,

*centum tectæ naves, et quinquaginta leviores apertæ, et triginta Issaici lembi, xxxiii. 19, cum classe centum tectarum navium, ad hoc levioribus navigiis cercurisque ac lembis ducentis, xxxv. 26, tres tectas naves, et lembos pristisque, xxxvii. 27, piraticas celoces et lembos.* They had not any rams. Livy, xxxii. 32, *cum quinque lembis et una nave rostrata.* The number of oars was variable. Livy, xxxiv. 35, quoting from the treaty between Rome and Sparta in 195 B.C., *neve ipse (Nabis) navem ullam præter duos lembos, qui non plus quam sexdecim remis agerentur, haberet.* Vessels of this class sometimes carried fifty men. Polybios, ii. 3, *προσπλέουσι τῆς νυκτὸς ἑκατὸν λέμβοι πρὸς τὴν Μεδωνίαν, ἐφ' ὧν ἦσαν Ἰλλυριοὶ πεντακισχίλιοι*, cf. Strabo, ii. 3. 4, *λέμβον συμπηξάμενος πεντηκοντόρω πάρσων.* But there was space on board for many men besides the rowers. Livy, xlv. 28, *octingenti ferme Gallorum occisi, ducenti vivi capti; equi, etc.... viginti eximie equos formæ cum captivis eisdem decem lembos, quos ante miserat, Antenor devehere Thessalonicam iussit.* Thus, upon the average, these vessels each took twenty men and two horses in addition to the crew; so they clearly were more roomy than the regular war-ships. Yet some were narrow enough for the oars to be sculled in pairs. Livy, xxiv. 40, *legati venerunt nuntiantes Philippum primum Apolloniam tentasse, lembis biremibus centum viginti flumine adverso subvectum, deinde, etc.* cf. Virgil, georgics, i. 201, 202, *qui adverso vix flumine lembum | remigiis subigit.*

At an earlier date the term had been applied to ship's-boats: see the passages quoted from Demosthenes and Anaxandrides in note 226 on p. 103. These authors were contemporary with Aristotle, so his *πλοῖον λεμβῶδες*, with its sharp prow, was presumably a boat of that sort: *de animalium incessu, 10, στήθος δὲ (τῶν γαμψωνύχων) ἰσχυρὸν καὶ ὀξύ, ὀξύ μὲν πρὸς τὸ εὐπορον εἶναι, καθάπερ ἂν ἐλ πλοίου πρῶτα λεμβῶδους, ἰσχυρὸν δὲ κ.τ.λ.* The small boats used for embarking on a ship are styled *lembi* by Plautus, mercator, i. 2. 81, 82, *dum hæc aguntur, lembo advehitur tuus pater paucillulo; | neque quisquam hominem conspicatust, donec in navim subit*, ii. 1. 35, *inscendo in lembum atque ad illam navim devehor.* And as Plautus adapted his *Mercator* from Philemon's *Ἐμπορος*, this usage may date from the time of Aristotle. The term is applied to a fisherman's boat by Theocritus, xxi. 12, *μήνινθοι κῶπα τε γέρων τ' ἐπ' ἐπελμασι λέμβος*, and also by Accius, apud Nonium, p. 534, *eo ante noctem extremam, retiâ ut perveherem et statuerem, | forte aliquando solito lembo sum progressus longius.* Vessels of this name are mentioned again by Sisenna, *ibid.*, *Otacilius legatum cum scaphis ac lembis*, and by Turpilius, *ibid.*, *hortari nostros ilico cæpi, ut celerarent lembum, and lembi redeuntes donum duo ad nostram adcelerarunt ratem.*

Pliny, vii. 57, *lembum (invenerunt) Cyrenenses.* That probably refers to the earlier vessels of this name, that were used as ship's-boats, etc.

### *Lenunculi.*

This term was apparently a corruption of *lembunculi*, a diminutive of *lembi*, and hence applied to any small boats.

Sallust, apud Nonium, p. 534, *incidit forte per noctem in lenunculo piscantis.* Ammianus, xiv. 2. 10, *piscatorios quærunt lenunculos, vel innare temere contextis ratibus parant*, xvi. 10. 3, *anhelante rabido flatu ventorum lenunculo se commisisse piscantis*, where the allusion is to Cæsar's attempt to cross the Adriatic in an open

boat. Tacitus, *Annales*, xiv. 5, *nando (Agrippina) deinde occursum lenuncularum Lucrinum in lacum vecta villa suae infertur*. The term is applied to ship's-boats by Cæsar, *de bello civili*, ii. 43, *magistrisque imperat navium, ut primo vespere omnes scaphas ad litus adpulsas habeant.....qui in classe erant, proficisci properabant: horum fuga navium onerariarum magistros incitabat. pauci lenunculi ad officium imperiumque conveniebant*.

There were guilds of *lenuncularii* at Ostia near the mouth of the Tiber. Corp. Inscr. Latin. vol. xiv, nos. 250, 251, *ordo corporatorum lenunculariorum tabulariorum auxiliariarum Ostiensium*, no. 252, *o. c. l. pleromariarum a. O.*

### *Lintres.*

These were small boats, chiefly for use on rivers.

Cæsar, *de bello Gallico*, i. 12, *ratibus ac lintribus iunctis transibant*. This refers to the Saône. cf. Ausonius, *idyllia*, 12, *grammaticomastix*, 10, *lintribus in geminis constratus, Ponto sit, an Pons?* Cæsar, *de bello Gallico*, vii. 60, *conquirit etiam lintres: has magno sonitu remorum incitatas mittit*, etc. That refers to the Seine. Livy, xxi. 26, *itaque ingens coacta vis navium est, lintriumque temere ad vicinalem usum paratarum; novasque alias cavabant ex singulis arboribus*. That refers to the Rhone. The *naves* and *lintres* of Livy are the λέμβοι and μονόξυλα of Polybios, iii. 42. Pliny, vi. 26, *regio autem, ex qua piper monoxyllis lintribus Baracen convehunt, vocatur Cottonara*. These places were in India. Ovid, *fasti*, vi. 779, *ferre coronatæ iuvenum convivia lintres*. That refers to the Tiber. Cicero, *pro Milone*, 27, *lintribus in eam insulam (in lacu Prelio) materiem, calcem, cæmenta atque arma convexit*. See also Cicero, *Brutus*, 60, *motus erat is, quem et C. Iulius in perpetuum notavit, quum ex eo in utramque partem toto corpore vacillante quasivit, 'quis loqueretur e lintre,' ad Atticum*, x. 10. 5, *ego vero vel lintriculo, si navis non erit, eripiam me ex istorum parricidio*. And also Ulpian, in the *Pandects*, iv. 9. 1. 4, *de exercitoribus ratium, item lintrariis nihil cavetur: sed idem constitui oportere, Labeo scribit, sc. quod de exercitoribus navium*.

### *Lusoria.*

These were the war-ships constructed for the frontier rivers of the Roman Empire, as distinguished from those constructed for the high seas.

Vegetius, ii. 1, *classis item duo genera sunt, unum liburnarum, aliud lusoriarum. classibus (servantur) maria vel flumina*. iv. 46, *in Danubio agrarias cotidianis tutantur excubiis, sc. lusoriae*. In the Theodosian Code, vii. 17, there is a law *de lusoriis Danubii* dated in 412 A.D. It fixes the strength of that fleet at 225 ships; and provides for the construction of thirty-one every year, so as to renew the whole fleet in about seven years. By Novel 24, dated in 443 A.D., the Emperor directs the *Magister Officiorum* to furnish an annual report from certain frontiers *quemadmodum se militum numerus habeat, castrorumque ac lusoriarum cura procedat*; and this order is repeated by Justinian in his Code, i. 31. 4. But while Justinian says vaguely *super omni limite sub tua iurisdictione constituto*, Theodosios says explicitly *iam Thraci, quam Illyrici, nec non etiam Orientalis ac Pontici limitis, Ægyptiaci insuper, Thebaici, Lybici*: and this suggests that *lusoriae* were then in use upon the Euphrates and the Nile as well as the Danube. Ammianus, xvii. 2. 3, xviii. 2. 12, speaks of *lusoriae* on the Meuse in 357 A.D.,



and on the Rhine in 359 A.D. Vopiscus, Bonosus, 15, speaks of them on the Rhine in 280 A.D.

For an earlier use of the term, see note on *thalamegi* on p. 123.

### *Monoxyla, Μονόξυλα.*

These were vessels of a single piece of timber, formed by simply hollowing out the trunk of a tree. They were in common use in many regions at many periods.

Xenophon, *anabasis*, v. 4. 11, *τριακόσια πλοῖα μονόξυλα, καὶ ἐν ἑκάστῳ τρεῖς ἄνδρας*. These were on the Black Sea. Polyænos, v. 23, *σκάφας τρεῖς μονοξύλους, ἑκάστην ἄνδρα ἓνα δέξασθαι δυναμένην*. These were also on the Black Sea. Heliodoros, *Æthiopica*, i. 31, *ἐπιβαίνει δὲ τοῦ σκάφους αὐτοὺς καὶ ὁ Θέρμουθις καὶ τρίτος ὁ ἐρέτης· οὐ γὰρ πλείονας οἶά τε φέρειν τὰ λιμναῖα σκάφη ἀπὸ μῖνου ξύλου καὶ πρέμνου παχέος ἐνὸς ἀγροικότερον κοιλαινόμενα*. These were in the Delta of the Nile. Pliny, vii. 2, *arundines vero tanta proceritatis ut singula internodia alveo navigabili ternos interdum homines ferant*, cf. xvi. 65. These bamboos were said to grow in India. Pliny, xvi. 76, *Germaniæ prædones singulis arboribus cavatis navigant, quarum quædam et triginta homines ferunt*. The inevitable parody is supplied by Lucian, *veræ historiæ*, ii. 26, *οὕτω δὲ ἐμβιβάσας ὁ Ῥαδάμανθους πεντήκοντα τῶν ἡρώων εἰς ναὺν μονόξυλον ἀσφοδελίην παρήγγειλε διώκειν*. For further allusions to the *μονόξυλα*, see Aristotle, *historia animalium*, iv. 8. 6, for the Mediterranean. Arrian, *anabasis*, i. 3, and Theophylactos, *historia*, vi. 9, for the Danube. Porphyrogenitos, *de administrando imperio*, 9, for the Dnieper and the Black Sea. Pliny, vi. 26, for the west coast of India, *monoxylis lintribus*. Polybios, iii. 42, for the Rhone: also Livy, xxi. 26, *cavabant (lintres) ex singulis arboribus*. Velleius, ii. 107, for the Elbe, *cavatum ex materia alveum*. Strabo, iii. 2. 3, for the Guadalquivir; and iii. 3. 7, for the north coast of Spain.

Vessels of this sort were carried by the armies of the Roman Empire for the construction of floating-bridges. Vegetius, iii. 7, *sed commodius repertum est ut monoxylus, hoc est, paulo latiores scaphulas ex singulis trabibus excavatas, pro genere ligni et subtilitate levissimas, carpentis secum portet exercitus, tabulatis pariter et clavis ferreis præparatis. ita absque mora constructus pons, etc.* cf. ii. 25. Leo, *tactica*, xvii. 13, *συμπηγνύουσι (οἱ καβαλλάριοι) γέφυραν ἥ διὰ ξύλων μεγάλων ἢ διὰ μικρῶν πλοκαρίων, τῶν λεγομένων μονοξύλων*.

### *Myoparones, Μυοπάρωνες.*

These were fighting-ships of no great size. They were in use throughout the Mediterranean in the First Century B.C. for warfare and for piracy. Apparently they were broader than the regular war-ships in proportion to their length, and therefore better able to keep the sea.

Appian, *de bellis civilibus*, v. 95, *ἐδωρήσατο δὲ καὶ Ὀκταοῦλα τὸν ἀδελφόν, αἰτήσασα παρ' Ἀντωνίου, δέκα φασήλοις τριηρετικοῖς, ἐπιμύκτοις ἐκ τε φορτίδων νεῶν καὶ μακρῶν· καὶ τὴν Ὀκταοῦλαν ὁ Καῖσαρ χιλίοις λογάσι σωματοφύλαξιν, ὅς ἐπιλέξαιτο Ἀντωνίους = Plutarch, Antonius, 35, Ὀκταοῦλα τῶν ὠμολογημένων χωρὶς ἤτήσατο τῷ μὲν ἀδελφῷ παρὰ τοῦ ἀνδρὸς ἐλκοσι μυοπάρωνας, τῷ δ' ἀνδρὶ παρὰ τοῦ ἀδελφοῦ στρατιώτας χιλίους*. This was in 37 B.C. Appian and Plutarch are certainly referring to the same squadron, though they differ about its strength: so these

statements of theirs would naturally define the *μνοπάρωνες* as vessels of a hybrid species between the long ships and the round ships. But the difficulty is that Appian has no obvious motive for employing a periphrasis here to describe the *μνοπάρωνες*, seeing that he elsewhere mentions them by name: *de bello Mithridatico*, 92, *μνοπάρωσι πρῶτον καὶ ἡμολλαις, εἶτα δικρότοις καὶ τρήρεσι, de rebus Punicis*, 121, *ναυαὶ πεντήκοντα μὲν τριηρετικάις, κερκούροις δὲ καὶ μνοπάρωσι καὶ ἄλλοις βραχυτέροις πολλοῖς*. Moreover, in these passages he treats the *μνοπάρωνες* as ships of a single bank, and distinguishes them from *ναυαὶ τριηρετικάις*, whereas he describes the vessels in question as *φασήλοισι τριηρετικοῖς*. But among those *ναυαὶ τριηρετικάις* he must include some five-banked ships that he has mentioned just before, *πεντήρεις τε καὶ τρήρεις*, and in another passage he uses the phrase *σκεὺ τριηρετικὸν* for the gear belonging to ships of any number of banks from two to five, *præfatio*, 10, *τρήρεις δὲ ἀπὸ ἡμολλίας μέχρι πεντήρους, πεντακόσιαι καὶ χίλια· καὶ σκεὺ τριηρετικὰ διπλότερα τούτων*: so that he could not mean by *τριηρετικὸς* that a ship had three banks of oars, or necessarily more banks than one. Apparently, he employs the term *φασήλοισι*, like its equivalent in Latin, to denote a certain type of vessel that was not meant for warfare—see p. 120—and then adds *τριηρετικοῖς* to show that the type was so far modified that the vessels here were capable of fighting, though not entitled to rank with the regular war-ships, *ναυαὶ τριηρετικάις*—that they were, in fact, *ἐπιμίκτοις ἐκ τε φορτίδων νεῶν καὶ μακρῶν*. See note 60 on p. 23 for other examples of an intermediate type.

Vessels termed *πάρωνες* are mentioned by Polybios, *Fr.* 65, apud Suidam, s. v. *πάρωνες*:—ὁ δὲ ἐπλεῖ, παράπλους ποιησάμενος τοὺς Σιδητῶν *πάρωνας*· ἦκον γὰρ Ῥοδίοις ἐλς *συμμαχίαν*. And vessels termed *parones* and *parunculi* are mentioned in verses that are ascribed to Cicero by Isidore, origines, xix. 1. 20, *tunc se fluctigero tradit mandatque paroni*, and *parunculis ad litus iudet celeribus*. The *μνοπάρωνες* therefore bore a compound name: and a compound name would naturally be given to ships of an intermediate type.

The *μνοπάρωνες* are mentioned also by Sallust, apud Nonium, p. 534, *duobus prædonum myoparonibus*, and by Sisenna, *ibid.*, *navis que triginta biremis, totidem myoparonas*. Again by Plutarch, Lucullus, 2, *τριῶν Ἑλληνικοῖς μνοπάρωσι, καὶ δικρότοις Ἰσας Ῥοδιακαῖς*, 13, *ληστρικὸν μνοπάρωνα*. Also by Cicero, in Verrem, ii. v. 34, *si in prædonum pugna (quadrirems) versaretur, urbis instar habere inter illos piraticos myoparones videretur*. 37, *hic, te prætor, Heracleo archipirata cum quattuor myoparonibus parvis ad arbitrium suum navigavit. hic, te prætor, prædonum naviculæ pervagatæ sunt*. cf. ii. i. 34, iii. 80, v. 28. And by Aulus Hirtius, *de bello Alexandrino*, 46, *depressa scapha vulneratus tamen adnatus (Octavius) ad suum myoparonem. eo receptus, cum prælium nox dirimeret, tempestate magna velis profugit*.

### *Orariæ, Oriæ, Oriolæ, Prosumiæ.*

These were small craft employed on rivers and along the coast for traffic or fishing.

Pliny, *epistolæ*, x. 26, *nunc destino partim orariis navibus partim vehiculis provinciam petere: nam sicut itineri graves æstus ita continuæ navigationi etesiæ reluctantur*, cf. 28, *orarias naviculas*. Isidore, origines, xix. 1. 27, makes the word *littoraria*, but probably without authority. Plautus, *rudens*, iv. 2. 5, 6,

*salute oria, quæ in mari fluctuoso | piscatu novo me uberi compotivit*, iv. 3. 81, *mea opera et labore et rete et oria, trinummus*, iv. 2. 100, 101, *immo oriola advecti sumus | usque aqua adversa per umnem*. The *oriolæ* are identified with the *prosumiæ* by Aulus Gellius, x. 25, *prosumiæ vel geseoretæ vel oriolæ*. Nothing is known of the *geseoretæ*: but the *prosumiæ* are mentioned by Cæcilius, apud Nonium, p. 536, *cum ultro gubernator propere vertit prosumiam*, and again, *de nocte ad portum sum provectus prosumia*.

### *Phaseli, Φάσηλοι.*

These were vessels of a type that was especially suitable for carrying people from place to place. They were in use throughout the Mediterranean in the First Centuries B.C. and A.D.

Catullus, 4. 1—5, *phaselus ille, quem videtis, hospites, | ait fuisse navium celerissimus, | neque ullius natantis impetum trabis | nequisse præterire, sive palmulis opus foret volare, sive linteo*. This vessel had brought Catullus from Bithynia to Italy. Cicero, ad Atticum, i. 13. 1, *accepi tuas tres iam epistolas: unam a M. Cornelio, quam Tribus Tabernis, ut opinor, ei dedisti; alteram, quam mihi Canusinus tuus hospes reddidit; tertiam, quam, ut scribis, anchoris sublatis, de phaselo dedisti*. xiv. 16. 1, *quinto Non. conscendens ab hortis Cluvianis in phaselum epicopum has dedi litteras*. Atticus was crossing the Adriatic from Brindisi, and Cicero was cruising in the Bay of Naples. Sallust, apud Nonium, p. 534, *et forte in navigando cohors una, grandi phaselo vecta, a ceteris deerravit; marique placido a duobus prædonum myoparonibus circumventa*. This great ship clearly was dependent on her sails, since she was helpless when becalmed; and Cicero's phrase *phaselus epicopus* implies that some *phaseli* were not *epicopi*, and had not any oars to help them along. Juvenal, xv. 127, 128, *parvula fictilibus solitum dare vela phaselis, | et brevibus pictæ remis incumbere testæ*, cf. Virgil, georgics, iv. 289, *et circum pictis vehitur sua rura phaselis*. These were the earthenware tubs that served as boats in Egypt, the *ὀστράκωα πορθμεία* of Strabo, xvii. 1. 4. So a *phaselus* might be of any size.

These vessels are mentioned frequently in Latin. Ovid, *epistolæ ex Ponto*, i. 10. 39, *fragili tellus non dura phaselo*. Horace, odes, iii. 2. 28, 29, *fragilemve mecum | solvat phaselon*. Seneca, Hercules Cæteus, 695, 696, *nec magna meas aura phaselos | iubeat medium scindere pontum*. Martial, x. 30. 12, 13, *nec languet æquor; viva sed quies ponti | pictam phaselon adiuuvante fert aura*. Lucan, v. 518, *et latus inversa nudum munita phaselo, sc. domus*.

And they are mentioned occasionally in Greek. Appian, *de bellis civilibus*, v. 95, *ἐδωρησατο δὲ καὶ Ὀκταούτῃ τῶν ἀδελφῶν, αἰτῆσασα παρ' Ἀρτωνίου, δέκα φασήλοις τριηρετικοῖς, ἐπιμικτοῖς ἕκ τε φορτίδων νεῶν καὶ μακρῶν*. This passage has already been discussed in the note on the *μνοπάρωνες* on p. 118. Appian follows the Latin usage in treating the *φάσηλοι* as *φορτίδες νῆες*, and adds *τριηρετικοί* here to show that the vessels in question had something of the character of the *μακράι*. Strabo, however, reckons the *φάσηλοι* among the *μακρὰ πλοῖα*, and distinguishes them from the *σκευαγωγὰ*, in his account of the expedition of Ælius Gallus down the Red Sea in 25 B.C. Strabo, xvi. 4. 23, *πρῶτον μὲν διὰ τοῦθ' ἀμάρτημα συνέβη τὸ μακρὰ κατασκευάσθαι πλοῖα, μηδενὸς ὄντος μηδ' ἐσομένου κατὰ θάλατταν πολέμου. ὁ δ' οὐκ ἔλαττον ὀδοθήκοντα ἐναυπηγήσατο δίκροτα καὶ τριῆρεις καὶ φασήλους. γνοῦς*

δὲ ἀεψουσμένοι ἐναυπηγήσατο σκευαγωγὰ ἑκατὸν καὶ τριάκοντα, οἷς ἐπλευσεν ἔχων περὶ μυρίους πεζοὺς. By thus including these φάσηλοι among the μακρὰ πλοῖα, Strabo may perhaps imply that they were φάσηλοι τριηρετικοί, as Appian says, and in fact were *μυσπαράωνες*.

### *Pontones.*

These were merchant-ships of a type that was in use on the south coast of France in the First Century B.C.

Cæsar, de bello civili, iii. 29, *pontones, quod est genus navium Gallicarum, Lissi relinquit*, sc. Antonius. 40, *Lissum profectus (Cn. Pompeius) naves onerarias triginta a M. Antonio relictas intra portum aggressus omnes incendit*. The circumstances of the campaign suggest that these ships came from Marseilles.

At a later date the term denoted a pontoon. Paulus, in the Pandects, viii. 3. 38, *flumine interveniente, via constitui potest, si aut vado transiri potest, aut pontem habeat: diversum, si pontonibus traiciatur*. cf. Ausonius, idyllia, 12, *grammaticomastix*, 10, *lintribus in geminis constratus, Ponto sit, an Pons?*

### *Pristes, Πρίστεις.*

These were war-ships of no great size; yet large enough to carry rams. They were employed in Greek fleets in the Second Century B.C. The name denotes a shark.

Polybios, xvii. 1, *παρὴν ὁ μὲν Φίλιππος ἐκ Δημητριάδος ἀναχθεὶς εἰς τὸν Μηλιά κώπον, πέντε λέμβους ἔχων καὶ μίαν πρίστιν, ἐφ' ἧς αὐτὸς ἐπέπλει* = Livy, xxxii. 32, *eo rex ab Demetriade cum quinque lembis et una nave rostrata venit*. Livy elsewhere mentions them by name, xxxv. 26, *tres tectas naves, et lembos pristisque*, xlv. 28, *cum quadraginta lembis, adiecta ad hunc numerum quinque pristis erant*. They are again classed with the *lembi* by Polybios, xvi. 2, *κατάφρακτοι τρεῖς καὶ πεντήκοντα, σὺν δὲ τούτοις ἀφρακτα, λέμβοι δὲ σὺν ταῖς πρίστειν ἑκατὸν καὶ πεντήκοντα*. These instances fall between 201 and 168 B.C. Virgil, Æneid, v. 116, *velocem Mnestheus agit acri remige Pristin*: but *Pristis* is here the name of the ship.

The fish known as *pristis* was certainly a shark. Leonidas of Tarentum, in the Anthology, vii. 506, 3—10, *ἥ γὰρ ἐπ' ἀγκύρας ἔνοχον βάρος εἰς ἅλα δύνων, | Ἰόνιον θ' ὑγρὸν κύμα κατερχόμενος, | τὴν μὲν ἔσωσ'· αὐτὸς δὲ μετὰ τροπος ἐκ βυθοῦ ἐβρών | ἥδη καὶ ναῦταις χεῖρας ὀρεγνύμενος, | ἐβρώθην· τοῖόν μοι ἐπ' ἀγριον εὖ μέγα κῆτος | ἦλθεν, ἀπέβρωξεν δ' ἀχρὶς ἐπ' ὀμφαλλόν. | χῆμισι μὲν ναῦται, ψυχρὸν βάρος, ἐξ ἁλὸς ἡμῶν | ἦρανθ', ἡμισυ δὲ πρίστις ἀπεκλάσατο*. Thus, the sailor had been diving to recover an anchor, and was just being hauled into the ship again, when the lower half of his body was bitten off and swallowed by a *pristis*. That was the act of a shark, and of no other fish. Aristotle, *historia animalium*, vi. 11. 10, *οἱ μὲν οὖν γαλεοὶ καὶ οἱ γαλεοειδεῖς, ὅσον ἀλώπηξ καὶ κύων, καὶ οἱ πλατεῖς ἰχθύες, νάρκη καὶ βάτος καὶ λειόβατος καὶ τρυγὼν, τὸν εἰρημένον τρόπον ζωοτοκοῦσιν ὥστοκέσσαντες*. 12. 1, *δελφὶς δὲ καὶ φάλαйна καὶ τὰ ἄλλα κῆτη, ὅσα μὴ ἔχει βράγχια, ἀλλὰ ψυσητήρα, ζωοτοκοῦσιν, ἐτι δὲ πρίστις καὶ βοῦς· οὐδὲν γὰρ τούτων φαίνεται ἔχον ψά, ἀλλ' εὐθέως κύημα, ἐξ οὗ διαβρογμένου γίνεται τὸ ζῶον, καθάπερ ἀνθρώπου καὶ τῶν τετραπόδων τὰ ζωοτόκα*. Here the *πρίστις* and *βοῦς* are distinguished from those *κῆτη* which had *ψυσητήρα* in place of βράγχια, i.e. the marine mammals, or Cetacea. And they are also distinguished from some species of sharks, in that they were viviparous in the

strictest sense, while these were ovo-viviparous: but this distinction seems dubious. The passage, however, refutes the opinion that the *pristis* was a whale. Linnæus was clearly in error in describing the saw-fish as *pristis antiquorum*. He probably took *πλεω* in the sense of sawing, whereas it also refers to biting; and the shark is pre-eminently the biter.

### *Rates, Σχεδιαί.*

These terms were applied to rafts of various kinds; also to floating-bridges; and occasionally to ships.

Rafts were used for moving timber from place to place: and sometimes were of immense size, requiring many masts and sails. Theophrastos, *historia plantarum*, v. 8. 2, μέγιστα δὲ (ξύλα) καὶ παρὰ πολὺ τὰ ἐν τῇ Κύρῳ φασι εἶναι... διαβάντας δὲ τινὰς ἀποτεμέσθαι πᾶμπολυ πλῆθος ἐκ τόπου βραχέος ὥστε τηλικαύτην ποιῆσαι σχεδίαν ἢ ἐχρήσατο πεντήκοντα ἱστίοις· οὐ μὴν ἀλλὰ διαπεσεῖν αὐτὴν ἐν τῷ πελάγει. Vitruvius, ii. 9. 14, *propterque pondus (larix) ab aqua non sustinetur; sed cum portatur, aut in navibus aut supra abiernas rates collocatur*. Such rafts would consist entirely of timber; but others were floated on skins or jars or casks. Xenophon, *anabasis*, ii. 4. 28, οἱ βάρβαροι διηγόν ἐπὶ σχεδίας διφθερίαις ἄρτους, τυροὺς, οἶνον. This was on the Tigris. Pliny, viii. 6, *centium quadraginta duo (elephanti) fuere transvecti ratibus, quas doliorum consertis ordinibus imposuerat, sc. Metellus*. The passage was from Sicily to Italy, and the date was 251 B.C. See also Diodoros, xix. 54. 3, for transport of elephants from Megara to Epidauros on σχεδίαι in 315 B.C.; and Polybios, iii. 46, and Livy, xxi. 28, for transport of elephants across the Rhone on σχεδίαι or rates in 218 B.C. Lucan, iv. 420—422, *namque ratem vacuæ sustentant undique cuppe, | quarum porrectis series constricta catenis | ordinibus geminis obliquas excipit alnos*. This raft was built for fighting; so a large space was left open in the middle, for the rowers to work their oars there out of reach of missiles: 423—426, *nec gerit expositum telis in fronte patenti | remigium: sed, quod trabibus circumdedit æquor, | hoc ferit; et taciti præbet miracula cursus, | quod nec vela ferat, nec apertas verberat undas*.

The floating-bridges which the Persians threw across the Dardanelles and Bosphoros are termed σχεδίαι by Æschylos, *Persæ*, 69, and by Mandrocles in the epigram quoted by Herodotos, iv. 88, and also by Herodotos himself, iv. 88, 89, vii. 36; and he applies the term to other floating-bridges, iv. 97, viii. 97. Livy, xxi. 47, *biduo vix locum rate iungendo (Pado) flumini inventum tradunt*. Strabo, xvii. 1. 16, καὶ σχεδία ἐξευκται ἐπὶ τῷ ποταμῷ, ἀφ' ἧς καὶ τοῦνομα τῷ τόπῳ, sc. Σχεδία. This refers to the toll-bar across the Canopic arm of the Nile.

Sea-going ships are described as πορτοπόρους σχεδίας by Euripides, *Hecuba*, 113. In the *Odyssey*, v. 251, Ulysses' boat is described as εὐρείαν σχεδίην, and Theocritus uses the phrase εὐρείαν σχεδίαν for Charon's boat, xvi. 41. Among the Roman poets *rat* bore this meaning: Catullus, 63. 1, 64. 121; Virgil, *georgics*, ii. 445, *Æneid*, i. 43, iii. 192, iv. 53, v. 8, vi. 302; etc.

### *Speculatoriæ, Κατάσκοποι, Tabellariæ.*

These were small vessels for reconnoitring and for carrying despatches. Apparently, they became a distinct class in the First Century B.C. In the Fifth

Century A.D. the hulls of these vessels and their sails and ropes used all to be painted the colour of sea-water, to keep them out of sight.

Livy, xxxvi. 42, *una et octoginta constratis navibus, multis præterea minoribus, quæ aut aperta rostrata aut sine rostris speculatoria erant, Delum traiecit*. Plutarch, Cato Minor, 54, ἦσαν δὲ πεντακοσίων μὲν οὐκ ἐλάττους αἱ μάχιμοι, λιβυρικά δὲ καὶ κατασκοπικά καὶ ἄφρακτα παμπληθῆ, Pompeius, 64, ἦσαν γὰρ αἱ μάχιμοι πεντακόσιοι, λιβυρινῶν δὲ καὶ κατασκόπων ὑπερβάλλων ἀριθμός. For this use of μάχιμοι in place of κατάφρακτοι, cf. Pseudo-Callisthenes, i. 28, ναυπηγήσας λιβέρνους καὶ τριήρεις καὶ ναῦς μαχίμους ποιήσας. Livy and Plutarch both treat the scouts as a distinct class of vessels; but Polybios speaks as though the scouting was done by any vessels that were available. Livy, xxii. 19, *inde duæ Massiliensium speculatoria missæ retulerunt classem Punicam stare in ostio, etc.* = Polybios, iii. 95, προπέστειλε κατασκευομένας δύο ναῦς ταχυπλοούσας Μασσαλιωτικάς... διασαφούντων δὲ τῶν ἐπὶ τὴν κατασκοπὴν ἐκπεμφθέντων ὅτι περὶ τὸ στόμα, κ.τ.λ. Livy, xxx. 10, *intervalla fecit, quæ procurrere speculatoria naves in hostem ac tuto recipi possent.* = Polybios, (xiv. 10), apud Suidam, s. v. ὑπηρετικοίς:—βραχὺ διάστημα ποιῶν, ὥστε ὑπηρετικοὺς ἐκπλεῖν δύνασθαι καὶ διαπλεῖν. And Livy doubtless used *speculatoria* in transcribing from Polybios, i. 53, ὁμοίως δὲ καὶ τοῖς ἐκ τῶν Συρακουσῶν προπεσταλμένοις ταμίαις ἀνιγγεῖλαι αἱ προπλεῖν εἰσισμένοι λέμβοι τὸν ἐπίπλουον τῶν ὑπεναντίων. The inference is that the scouts did not become a distinct class until after the time of Polybios; and that Livy is guilty of some anachronisms. They usually were small vessels. Livy, xxxv. 26, *ipse Philopæmen in levi speculatoria nave fugit*, xxx. 10, *speculatoria naves ac levia navigia*. Caesar, de Bello Gallico, iv. 26, *speculatoria navigia*. The inscription mentioning *speculatores classis Misenensis* is a forgery: see Corp. Inscr. Latin. vol. x, no. 247\*.

Seneca, epistolæ, 77, *subito nobis hodie Alexandrinæ naves apparuerunt, quæ præmitti solent et nuntiare secururæ classis adventum: tabellarias vocant*. These vessels *quæ præmitti solent* answer to the προπλεῖν εἰσισμένοι of Polybios, i. 53. And the regular scouts also served as *tabellariæ*. Aulus Hirtius, de bello Africano, 26, *per catascopum (litteras) mittit*.

The term *exploratoria* is employed by Vegetius, iv. 37, *scaphæ tamen maioribus liburnis exploratoria sociantur, quæ vicenos prope remiges in singulis partibus habeant...ne tamen exploratoria naves candore prodantur, colore veneto, qui marinis est fluctibus similis, vela tinguntur et funes; cera etiam, qua ungere solent naves, inficitur: nautæque vel milites venetam vestem induunt*.

### *Thalamegi*, Θαλαμηγοί.

These were house-boats of extraordinary size and splendour, constructed by the Ptolemies for their voyages upon the Nile.

Strabo, xvii. 1. 16, διέχει δὲ τετράσχοινον τῆς Ἀλεξανδρείας ἡ Σχεδία, κατοικία πόλεως, ἐν ἣ τὸ ναύσταθμον τῶν θαλαμηγῶν πλοίων, ἐφ' οἷς οἱ ἡγεμόνες εἰς τὴν ἀνω χῶραν ἀναπλέουσιν, cf. 15, εὐωχοῦνται δ' ἐν σκάφαις θαλαμηγοῖς. Suetonius, Julius Cæsar, 52, *nave thalamego pæne Æthiopia tenus Ægyptum penetravit*. Appian, præfatio, 10, θαλαμηγά τε χρυσόπρυμνα καὶ χρυσέμβολα, ἐς πολέμου πομπήν, οἱ αὐτοὶ διαπλέοντες ἐπέβαινον οἱ βασιλεῖς, ὀκτακόσια. This refers to the Ptolemies. Athenæos, v. 38, κατεσκεύασε δ' ὁ Φιλοπάτωρ καὶ ποτάμιον πλοῖον, τὴν θαλαμηγὸν καλουμένην, τὸ μῆκος ἔχουσαν ἡμισταδίον, κ.τ.λ. Athenæos is quoting from Calli-

xenos, and his account of the vessel seems untrustworthy throughout. Diodoros, i. 85, ἔπειτα (τὸν μύσχον) εἰς θαλαμηγὸν ναῦν οἰκημα κεχρυσωμένον ἔχουσιν ἐμβιβάζοντες, ὡς θεὸν ἀνάγουσιν εἰς Μέμφιν. This bull was the Apis.

The term *thalamegus* used sometimes to be replaced by *cubiculata* or *lusoria*. Seneca, de beneficiis, vii. 20, *cui triremes et aratas non mitterem, lusorias et cubiculatas et alia ludibria regum in mari lascivientium mittam*. Epiphanius, ancoratus, 106, ὡς ὁ Ἀντίλοος, ὁ ἐν Ἀντινέου κεκηδευμένος, καὶ σὺν λουσορίῳ πλοῖῳ κείμενος ὑπὸ Ἀδριανοῦ οὕτως κατετάγη.

### Tragi, Τράγοι.

These were vessels of a type invented by the Lycians.

Sisenna, apud Nonium, p. 534, *prores actuarie tragi grandes ac phaseli primo*. cf. Pollux, i. 83, ἔστι δὲ τινα πλοῖα Λύκία λεγόμενα κριοὶ καὶ τράγοι. Plutarch, de mulierum virtutibus, 9, ἔπλει δὲ (Χίμαρος) πλοῖῳ λέοντα μὲν ἔχοντι πρόραθεν ἐπίσημον, ἐκ δὲ πρύμνης δράκοντα, καὶ πολλὰ κακὰ τοὺς Λυκίους ἐποίει. As the Chimæra was a goat with a lion's head and a snake's tail, this vessel must have been a τράγος.

### Vectoriæ, Ἐπιβατηγοί.

These were vessels for carrying passengers. They were not used for cargo. These names were applied to them in the Second Century A.D.

Ulpian, in the Pandects, xiv. 1. 1. 12, *quædam enim naves onerariæ, quædam (ut ipsi dicunt) ἐπιβατηγοί, id est vectorum ductrices, sunt.....ut, ecce, sunt naves quæ Brundisium a Cassiopa vel a Dyrrhachio vectores traiciunt, ad onera inhabiles*. Suetonius, Julius Cæsar, 63, *cum per angustias Hellesponti vectoria navicula traiceret*. This was presumably a passenger-boat; but Cæsar, de bello Gallico, v. 8, uses the phrase *vectoriis gravibusque navigiis* for vessels carrying troops and stores. See note on *phaseli* on p. 120 for other vessels of this class.

The boats from Brindisi to Durazzo connected the Appian Way from Rome with the Egnatian Way to Salonica and the East. Cassiopa lay at the northern end of Corfu, and was on the route from Italy to Greece.

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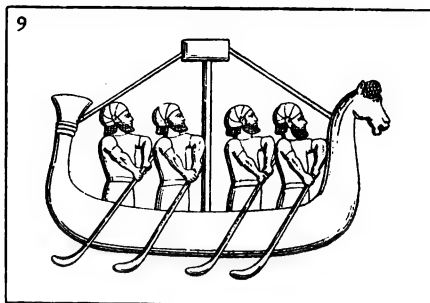
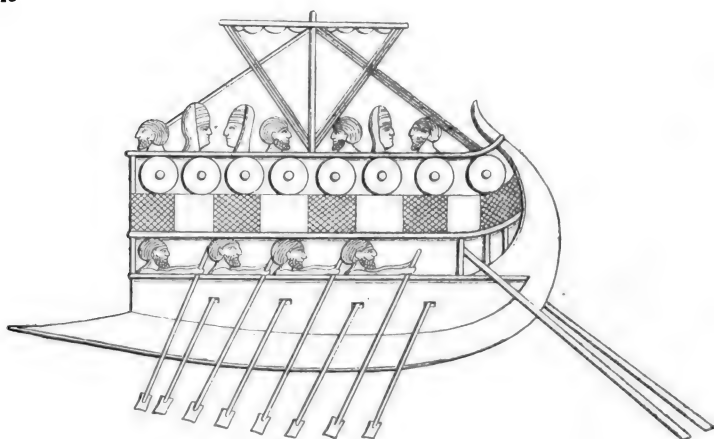


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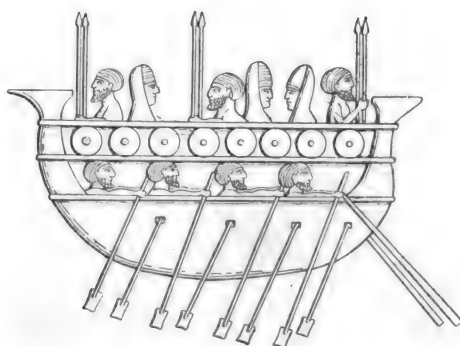
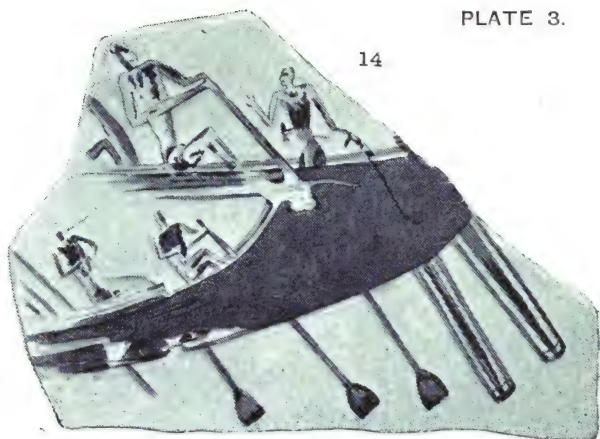




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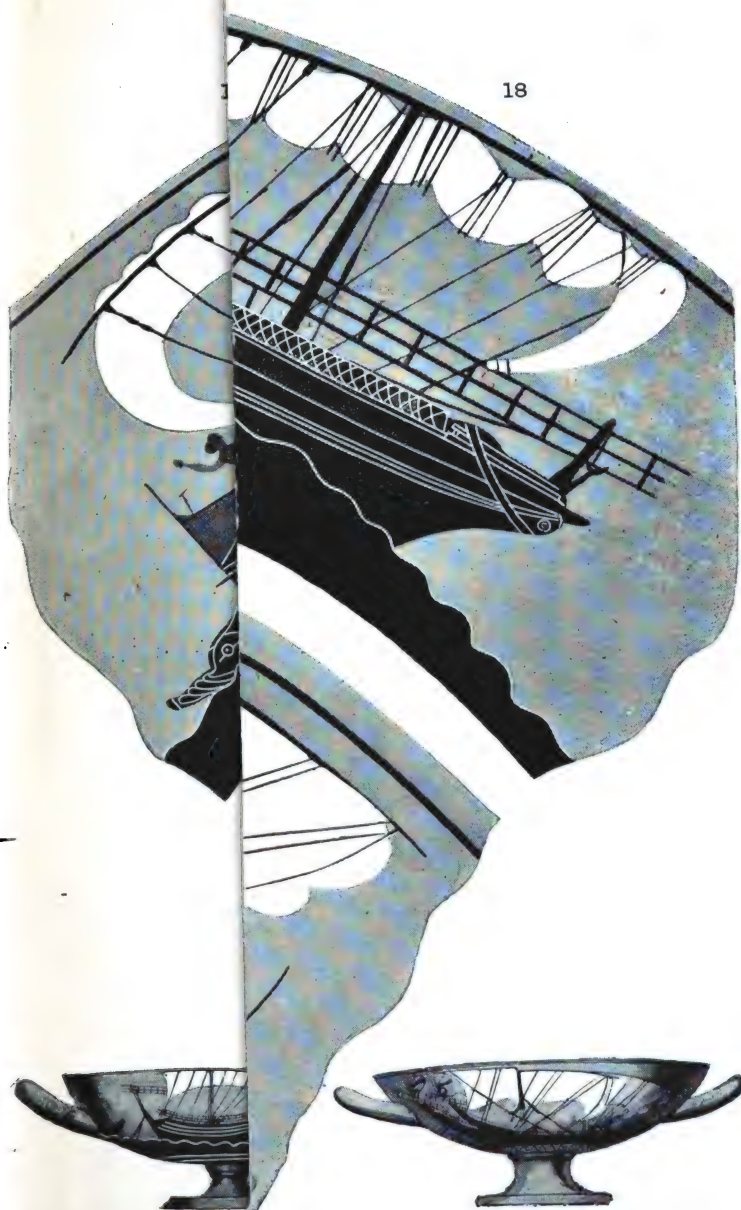


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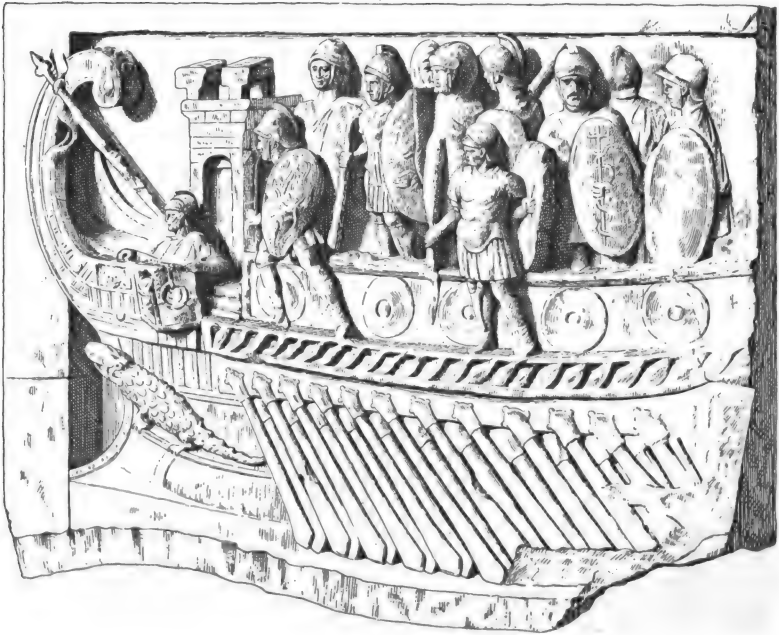




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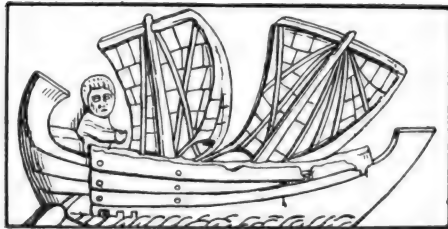








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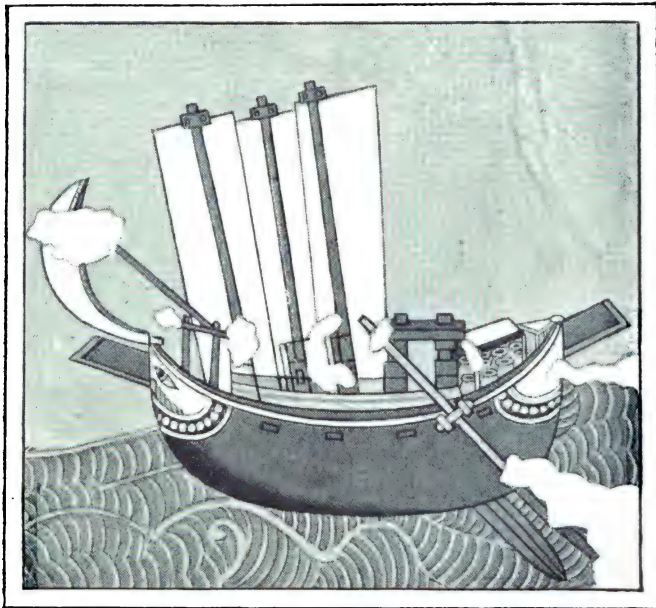
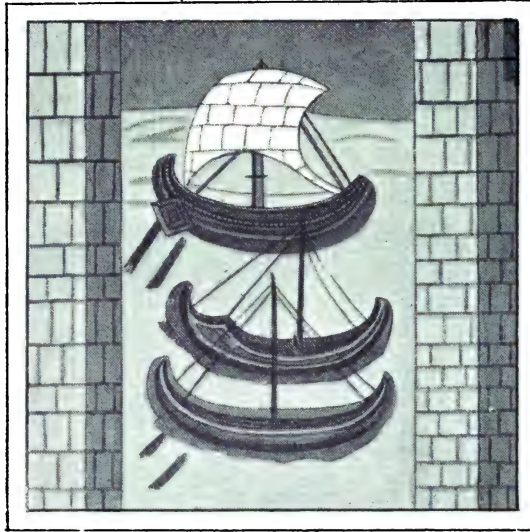




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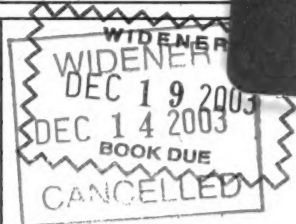


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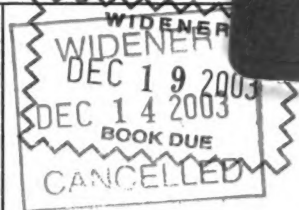
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